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A National Newspaper for Every Branch of the Industry

Automotive Daily News

CARS · SHOP EQUIPMENT · TRUCKS · AVIATION · PARTS · ACCESSORIES · TIRES

Vol. 10. No. 1284 — Entered as second-class matter Aug. 27, 1925, Post Office, N. Y., N. Y. Under Act of March 3, 1879 — NEW YORK, FRIDAY, AUGUST 29, 1930 — 10 Cents. $12 Per Year

PARTS-ACCESSORY SHIPMENTS FIRM

PRODUCTION OF TRUCKS IN U. S. TOPS 1928, 1927

NEW YORK, Aug. 28.—Commercial car production in the United States in the first seven months of the current year was only 5.9 per cent. under the average for the corresponding period in the three years immediately preceding 1930, according to the figures issued this week by the Department of Commerce.

The building of trucks was maintained at a higher level in relation to the three years preceding than the production of passenger cars, the latter having been 14 per cent. under the three-year average.

The total truck output was 359,684, as compared with 526,355 for the first seven months of last year, 293,594 in the corresponding period of 1928, 327,691 in the similar period of 1927 and with a three-year average of 382,546.

While production of the industry as a whole for the seven months was 5 per cent. under the corresponding period of 1928 and only 5 per cent. above 1927, the building of trucks went forward this year at a rate 15 per cent. above 1928 and 9 per cent. above 1927. Contrary to the trend of passenger car production, the truck output fell off in 1928 from 1927.

In three of the first seven months of the year production of commercial cars in the United States was above the average for the corresponding months of the three years immediately preceding. In February the output was 7.4 per cent. higher than the average, while in March the gain was 17.1 per cent., and in April it was 14.3 per cent.

January showed a loss of 3.6 per cent., May 13.4 per cent. from the average, June 25 per cent., and July 34 per cent.

In each of the first six months of the year the output was substantially higher than for the corresponding month of 1928, but in July it dropped to below the correspond-

(Continued on Page 2)

C. I. T. TO FINANCE SALES OF BENDIX AIR BRAKES

New York, Aug. 28.—The Bendix-Westinghouse Automotive Air Brake Company of Pittsburgh, Pa., has completed arrangements with Commercial Investment Trust, Inc., for the financing of time payment sales of its air brakes for trucks and buses.

PEERLESS DEALERS IN HEALTHY CONDITION

Cleveland, Aug. 28.—William T. Young, Jr., general sales director of Peerless, today reported the dealer organization of his company in an unusually healthy condition. "Our records show a decrease of 8 per cent. in the total number of Peerless dealers and distributors over the same date in 1929," says Mr. Young.

"Since the announcement of the present line of Peerless straight eights, there has been a slight increase in the total number of distributors and dealers of record. Stocks of both new and used cars in the hands of Peerless dealers are the lowest in several years. This fact, coupled with the betteer margin of profit offered by a higher priced line and greatly reduced overheads, has placed Peerless dealers generally in an excellent position, both as to present requirements and future conditions."

OAKLAND-PONTIAC SALES SHOW SHARP INCREASE

DETROIT, Aug. 28.—A sharp rise in national new car sales accompanied by a substantial increase in used car sales is reported by A. R. Glancy, president of the Oakland Motor Car Company, for the ten-day period ended August 20.

Sales of new Oakland eights and Pontiac sixes increased 70 per cent. over the previous ten-day period, while used car sales rose more than 18 per cent. Every section of the United States contributed toward the improved sales.

"A portion of this increased new car business of course must be credited to the Oakland-Pontiac price reductions announced to the public August 12," said Mr. Glancy. "But no such factor contributed toward the ten-day sales of 5,635 used cars by Oakland-Pontiac dealers, an increase of 18.6 per cent. over the previous period, which leaves in their hands less than a 40-day stock of used cars.

"This improvement in used car buying developing without the impetus of lower prices appears even more significant than does the rise in new car sales, indicating as it does a gradual improvement in general conditions accompanied by larger public purchasing.

"Broken down into the five major geographical sections of the United States, the Oakland-Pontiac sales increase for the ten-day period are as follows:—

Section, Pacific Coast, new cars, 84.38 per cent.; used cars, 31.52 per cent.; section, Great Lakes, 83.85; used cars, 14.65; section, Central West, new cars, 76.70; used cars, 19.03; section, South, new cars, 68.48; used cars, 15.43; section, East, new cars, 51.42; used cars, 21.96.

"The Oakland Motor Car Company is continuing the development of two new cars to be presented in the winter embodying only slight changes in appearance and design and with the same type engines used in the cars now offered."

Car Sales in Oklahoma In July 39% Over June

NEW YORK, Aug. 28.—Retail sales of new passenger cars in Oklahoma in July showed a sharp recovery from the preceding month, registrations amounting to 6,341, as compared with 4,451 in June, a gain of 39 per cent.

This total compared with 10,659 in the corresponding month of last year, a loss of 40 per cent.

Registrations of new cars in Oklahoma in the first seven months of the year amounted to 39,165, as compared with 57,750 in the corresponding period of last year, a falling off of 32 per cent., as against a decline for the whole country around 23 to 24 per cent.

The peak in sales of new cars in that state this year, according to the registration statistics received by Automotive Daily News, was in April, but July was a close second and February a close third. Last year the peak was in July, with April a close second. The April peak this year of 6,714 compared with 10,162 in the corresponding month of last year and with 10,659 in the peak month of July last year.

Following are the Oklahoma new car registrations, month by month, for the first seven months of this

(Continued on Page 2)

TODAY

Sparks from Detroit.....Page 2
Chevrolet sales, month by month, in each state.....Page 3
Editorial, "Allowances in 1930," Page 4
Ask us to tell you.....Page 4
Calendar of coming events, Page 4
S. A. E. papers on aircraft fuels, Pages 5, 7, 11
Engineering news.....Page 11

REFERENCE TABLES

Cumulative commercial car registration.....Page 6
Major specifications and mechanical details of commercial cars, Pages 8, 9, 10

CRUDE RUBBER USE IN UNITED STATES STEADY

New York, Aug. 28.—August consumption of crude rubber in the United States will total approximately 30,000 tons, or about the same as that of July, when consumption was 29,894 tons, although reports have been made of curtailment at the factories.

Rubber consumption for the first eight months of this year will be 279,775 tons, according to estimates by members of the Rubber Exchange of New York. During the same period last year consumption was 349,108 tons.

AUGUST BUSINESS HOLDS JULY LEVEL, M. E. A. REPORTS

Usual Seasonal Decline Took Place Last Month, But There Has Been No Further Falling Off, Figures Show

NEW YORK, Aug. 28.—July shipments of automotive parts-accessory manufacturers fell below June, as was expected, due to the general seasonal slowing up in the automotive field. Business of suppliers of original equipment to the car and truck manufacturers declined more than usual due to the fact that many of the car and truck plants were closed for inventory and vacation periods during the last month and were not accepting shipments, according to the Motor and Equipment Association.

August business is expected to hold up about even with July. Sales of the group of member wholesalers in the association to the retail trade were slightly ahead of June and may show a further slight increase for August. Member wholesalers' business in July ran ahead of June in nine of the twelve Federal Reserve districts and also in Canada.

The grand index of shipments for all groups of manufacturer members reporting their figures to the association in July stood at 88 per cent. of the January, 1925, base index of 100, as compared with 116 in June, 144 in May and 188 in July a year ago.

Reports by divisions of member manufacturers' business in July follow:

Parts-accessory makers, selling their products to the car and truck makers for original equipment, made shipments aggregating 83 per cent. of the January, 1925, base index, as compared with 119 in June, 153 in May and 205 in July, 1929.

Shipments to the trade by makers of service parts were 127 per cent. of the January, 1925, base index, as compared with 131 in June, 137 in May and 152 in July, 1929.

Accessory shipments to the trade in July were 65 per cent. of the 1925 base figure, as compared with 71 in June, 78 in May and 92 in July last year.

Service equipment shipments,

(Continued on Page 2)

CHANGING TRENDS IN EXPORT TRADE

Special from A. D. N. Washington Bureau

Washington, Aug. 28.—Changing trends in the United States export trade in farm machinery, particularly tractors, are seen in the record total registered during the first half of this year, it was revealed by the Department of Commerce today.

Russia recorded a gain of 328 per cent. over the first half of last year, the large increase being due to tractor business. During the June-January period of this year Russia bought tractors to the amount of 16,535 units, valued at $21,705,867, as compared with 4,448, worth $4,306,345 in the first half of last year.

Mexico also increased her purchases during the half year, tractor shipments accounting for most of the gain. Exports to the Irish Free State increased by 210 per cent., largely as a result of shipments of parts for use in Irish tractor production. On the other hand, other important purchasing countries decreased their purchases.

Canada showed a 30 per cent. decrease, the loss being mostly in the smaller purchases of tractors, which in 1930 amounted to 8,687, valued

(Continued on Page 2)

Graham Export Chief Says U. S. Controls Market

Detroit, Aug. 28.—"When the United States buys, the world buys from the United States," Walter R. Glennie, export manager of the Graham-Paige Motor Corporation, said today in a statement made after completing a six months' survey of conditions in foreign countries.

"United States regulates world trade because of its vast purchasing power and the huge consumption of goods," Glennie said.

"Since we have tightened up on our purchases during the past eight months, naturally foreign countries that export goods to us have been affected. Movement of merchandise to the United States from abroad has decreased and naturally cut down the incomes of the importers with the result that they have been buying less from us.

"European motor car manufacturers have never properly analyzed their markets at home and built cars to satisfy the market needs, and consequently American manufacturers have enjoyed a high percentage of motor business in foreign countries. The people abroad want American cars and will be willing to pay the additional prices European tariffs may set.

"I cannot help but view the automobile export situation with optimism and look for an immediate improvement in foreign business as soon as the United States resumes active buying again."

Truck Production Tops Output in 1928, 1927

(Continued from Page 1)

ing month two years ago. In only five of the first seven months did the production exceed that for the corresponding periods of 1927, in which year the truck production exceeded that of 1928. The months in which the output failed to reach the 1927 level were January and July.

Following is the motor truck production in the United States for the first seven months of this year, as compared with the corresponding periods in the three preceding years and with the three-year average, and the 1930 change from the average indicated:

	1930	1929	1928	1927	3-year average	% 1930 chg. from average
January	38,657	53,428	26,189	40,751	40,122	— 3.6
February	49,457	60,247	32,791	42,185	45,407	+ 7.4
March	64,204	71,799	42,031	50,641	54,823	+17.1
April	67,560	84,346	45,843	49,559	59,116	+14.3
May	54,370	88,510	51,103	48,718	62,810	—13.4
June	45,773	93,183	41,111	44,252	59,503	—25.2
July	39,663	74,342	54,526	51,585	60,151	—34.0
Totals	359,684	526,355	293,594	327,691	382,546	— 5.9

STATE AUTHORITIES URGE CARE IN USE OF WOOD ALCOHOL

New York, Aug. 28.—Dr. Matthias Nicoll, health commissioner of Westchester county and former New York state health commissioner, today warned the public against careless contact with wood alcohol.

His statement, issued at his White Plains office, follows:—

"I am heartily in favor of any laws, ordinances or restrictions which will render more safe the sale and handling of this extremely dangerous product."

Methanol (wood alcohol) is produced both by wood distillation and as a by-product of coal chemistry. It is being sold on a large scale this year for the first time since the tax-free denatured alcohol act of 1906 was passed, enabling industries to use tax-free alcohol containing only a small percentage of denaturant.

Its principal use heretofore has been as a denaturant for legally authorized industrial alcohol, only 4 per cent. being used in the anti-freeze variety.

Hartford, Conn., Aug. 28.—Health Bulletin No. 7, released today by the Connecticut State Health Department, says in regard to the industrial use of methanol:—

"At the present time methanol is being produced synthetically in large quantities. It is anticipated that it may be used widely as a solvent in industrial processes and as an automobile radiator anti-freeze solution. It is known that poisoning is caused by several hours' exposure to a concentration of only 0.2 per cent. of methanol vapor in air. Where there is continued exposure, it is suggested that the concentration of methanol in air be kept below 100 parts per million by volume. In answer to an often raised query, it may be stated that the toxic properties of methanol prepared by distillation of wood and of that prepared synthetically are essentially identical."

Washington, D. C., Aug. 28.—An investigation of the toxicity of methanol is being conducted by the United States Bureau of Mines, to which the task was assigned because the base of synthetic methanol is coal.

Tests are scheduled to begin soon at the bureau's Pittsburgh station, where dogs, monkeys and guinea pigs are being conditioned for extensive experimentation. It is announced that the tests will not be completed before October 15.

Chicago, Ill., Aug. 28.—Dr. Arnold H. Kegel, Chicago commissioner of health, today issued the following statement:—

"The history of methanol has conclusively demonstrated the following facts: Wood alcohol, or methanol, is poisonous when swallowed, inhaled, or absorbed through the skin. It is known that an exceedingly small amount of wood alcohol will produce poisonous symptoms. The toxicity is due to the methanol itself and not to impurities. The purer it is the greater is the danger. The number of cases of methanol poisoning has consistently fluctuated with the amount of methanol available to the general public. It may be confidently expected that an increased distribution of methanol will bring with it an increased amount of poisoning."

CHANGING TRENDS IN EXPORT TRADE

(Continued from Page 1)

at $8,101,412, as compared with 13,412, valued at $12,392,803 in the same period of last year.

Exports of agricultural shipments to Australia showed a 21 per cent. decrease, tractors making up the bulk of the purchases. Like Canada, Argentina showed a marked decline, about 25 per cent. of this year's shipments being made up of tractors.

CHRYSLER TAKES LONG LEASE ON N. Y. BUILDING

New York, Aug. 28.—A lease involving rentals of about $3,500,000 during the next twenty-one years has been signed by the Chrysler Sales Corporation for an eight-story structure on the west side of West End Avenue, between 65th and 66th Streets, in this city.

Four additional floors will be added to the building during the next fifteen years, and the annual rental of $162,450 will be increased at the rate of 50 cents for each square foot added.

Chrysler Sales Corporation has assigned the lease to the Chrysler Motor Parts Corporation, which will occupy the premises.

GRAHAM-PAIGE DEALERS GUESTS OF R. H. LOSEY

Indianapolis, Ind., Aug. 28.—R. H. Losey, who as head of the local Graham-Paige branch with supervision over other branches at Cincinnati, Louisville and Evansville, with the three Graham brothers was host to Graham-Paige dealers and salesmen from the three states at a meeting at Washington during the recent live stock and race meet, on returning to his office here, pointed to efforts being made by the Grahams to assist their former neighbors in the Washington area.

A special meeting of Graham-Paige representatives was called during the festivities, held on the 5,000 acre farm owned by the Grahams on which a race track had been built equipped with special lighting fixtures for the running of night races.

E. F. DEACON OF CLIMAX BACK FROM U. S. TOUR

Chicago, Aug. 28.—E. F. Deacon, president of the Climax Engineering Company, has just returned from an extended business tour, which included Wichita, Kan.; Oklahoma City, Tulsa, St. Louis, Fort Worth, Dallas, and Wichita Falls, Tex. With him on the trip were Robert Kerr, assistant chief engineer of Climax Engineering Company, and L. L. Machia, in charge of oil field sales.

CLASSIFIED ADVERTISEMENTS IN THE AUTOMOTIVE DAILY NEWS BRING RESULTS

OKLAHOMA NEW CAR SALES JUMP IN JULY

(Continued from Page ..

year, as compared with the corresponding months of 1929:

	1930	1929
January	3,933	6,458
February	6,267	7,328
March	5,737	8,643
April	6,714	10,162
May	5,632	8,195
June	4,541	6,305
July	6,341	10,659
Totals	39,165	57,750

Practically all makes of cars participated in the sudden upturn in new car sales in July, with Ford's total being 2,742, as against 2,115 in the preceding month, and Chevrolet registering 1,973 cars, as compared with 1,443 in June.

Buick sales were more than doubled; Dodge jumped sharply, and Willys and Packard business nearly doubled. Graham sales were more than doubled, as were those of Durant, Cadillac, Franklin, Reo, Cord and Windsor. Austin made its appearance for the first time in Oklahoma's registration report with thirteen cars. This placed the car between the La Salle and Pierce-Arrow on the list.

Following are the new car registrations in Oklahoma in July, as compared with the corresponding month of last year and with the preceding month this year:

	July 1930	July 1929	June 1930
Ford	2,742	4,168	2,115
Chevrolet	1,973	2,796	1,443
Buick	291	471	112
Dodge	238	465	143
Plymouth	149	217	95
Chrysler	113	172	63
Pontiac	100	456	93
Willys	74	38	38
Packard	66	53	34
De Soto	62	111	38
Studebaker	60	124	40
Nash	56	174	40
Oldsmobile	52	136	40
Graham	50	83	23
Durant	48	71	19
Essex	47	204	28
Whippet	42	551	40
Hudson	27	83	21
Oakland	22	80	26
Hupmobile	19	55	10
Cadillac	15	6	7
La Salle	14	30	11
Austin	13	*	0
Pierce-Arrow	12	18	7
Willys-Knight	10	38	6
Marmon	9	19	7
Franklin	8	21	2
Auburn	6	27	4
Reo	6	52	2
Cord	5	*	2
Viking	5	8	3
Windsor	4	7	0
Lincoln	2	9	2
Stutz-Blhawk	1	7	1
Miscellaneous	0	7	0
Totals	6,341	10,659	4,541

*Not in production.

AMARILLO PLANS SHOW DURING TRI-STATE FAIR

Amarillo, Tex., Aug. 28 (UTPS).—The Amarillo Automotive Association is making extensive plans for the automobile show that will be held here from September 22 to 28, inclusive, during the Amarillo Tri-State Fair.

The association, of which W. M. Frost of the Frost Motor Company is president, and G. C. Odom, the Oldsmobile dealer, is vice-president, has leased the new fireproof automobile building recently completed on the fair grounds. This building is 140 by 150 feet, and sixty-five dealers will have space for cars on the floor.

HENDRICKSON ON CHICAGO ANTI-NOISE COMMISSION

Chicago, Aug. 28. — Robert T. Hendrickson of the Hendickson Motor Truck Company has been appointed a member of the motor truck committee of the Chicago Anti-Noise Commission. Committees are working under supervision of Health Commissioner A. H. Kegel.

Surveys already made name railroads, elevated roads and street cars as the greatest noise makers, motor trucks and automobiles ranking second.

SPARKS from DETROIT

Austin Stirs Memories

* * *

On Foreign Trade

* * *

Bitters for the Bilious

* * *

TALKING about the Austin, as who is not these days, reminds me of the time the midget car first appeared on our roads. That was back in 1912 when L. G. Kaufman of New York represented the Peugeot in this country. Kaufman also backed a racing team which had Dario Resta for its star. Kaufman imported a flock of the Baby Peugeots and Gregory Flynn, now director of sales for Moto Meter and who has just moved his headquarters to Toledo, bought one of them. He paid $1,250 for it because it had three forward speeds as against the two found in the gear boxes of the others which sold for $950 and $1,000. Ever since Flynn has been an ardent admirer of this type of car.

Another enthusiast in those days was Lutcher Brown, a wealthy youngster who was so taken with racing that he put Ralph Mulford behind the wheel of a fast Peugeot and made racing history. A Baby Peugeot was used as the camp car. And after all those years Brown still favors the midget. When he was on his way to Lake Placid this summer he spotted the Austin and immediately bought one, which he took to the famous summer resort. Brown, by the way, is in Detroit this week. He is still the enthusiastic sportsman and he has two entries in the gold cup motor boat regatta which is a Detroit feature this week.

* * *

STUDYING reports of conditions in foreign countries for the past six months, Walter R. Glennie, export manager of the Graham-Paige Motors Corporation, is of the opinion that the foreign situation is not so desperate as some pessimists seem to think. As he sees it:—

"European motor car manufacturers never have properly analyzed their markets at home and built cars to satisfy the market needs, and consequently American manufacturers have enjoyed a high percentage of motor business in foreign countries. The people abroad want American cars and will be willing to pay the additional prices European tariffs may set. I cannot help but view the automobile export business with optimism and look for an immediate improvement in foreign business as soon as the United States resumes active buying again."

* * *

FRIENDS of John Mauro of the Hupp forces are giving John credit for great good luck as well as good work. Mauro has been district manager for Hupp for a good many years, spending a lot of time on the road, regardless of our generally unkind American weather. And now he picks himself a new job and what do you suppose it is? He is now sales representative for Hupmobile in Mediterranean countries. His territory will embrace Algeria and Morocco, not to mention bits of the Riviera.

Small wonder that his Detroit friends, meditating on coming blizzards and zero weather, bade John good-by to the tune of "pretty tough job you picked for yourself, old boy." We believe if we had his chance we could dope out some pretty good reasons why we should be on duty in Algeria during the worst part of the winter.

* * *

ON the way out to Detroit I traveled on the train with a bilious gentleman who spent most of the time bemoaning the condition of his native city. According to him every one and every industry was flat on its back gasping for air. The result was that when I got to town I expected to find something like a morgue.

After a week of scuttling around from office to office my point of view has changed absolutely. I find a subtle but unmistakably optimistic atmosphere. None of the big executives wants to put a day or an hour on when the revival is going to take place but they fully expect it. Several of them told me that it was already under way, but would not become definitely apparent for some weeks. The general belief seems to be that the business upturn is going to be very gradual at first, gaining momentum slowly, but that by or even before the first of the year, every one is going to realize that we are getting back to prosperity.

REPUBLIC RUBBER PLANTS IN YOUNGSTOWN REOPEN

Youngstown, O., Aug. 28.—After several weeks of minimum production, factories of the Republic Rubber Company have gone on a schedule of 85 per cent. of capacity operation, officials of the company announced. This plant is one of the most active outside the major rubber centers and has been turning out rubber products for the past several years.

AUGUST PARTS SALES KEEP AT JULY LEVEL

(Continued from Page 1)

that is, repair shop machinery and tools, in July were 115 per cent. of the 1925 base, as compared with 123 in June, 165 in May and 170 in July a year ago.

Chevrolet Sales, Month by Month, in Each State

TREND FOR HALF YEAR IS SHOWN

Record of Second Biggest Selling Car In 1930

NEW YORK, Aug. 28.—Complete new car registration figures for the first six months of 1930 reveal that Ford and Chevrolet made the best sales records among the lower priced cars. The Automotive Daily News in an earlier issue presented the Ford registrations, month by month for 1930 and 1929, for each state in the country.

In the following tabulation will be found the record made by Chevrolet in sales in each of the first six months of this year, as compared with the last:

	1930	1929
ALABAMA		
January	389	502
February	733	542
March	786	413
April	935	1,721
May	907	940
June	755	855
Totals	5,006	4,973
ARIZONA		
January	231	133
February	235	245
March	289	371
April	191	364
May	346	474
June	206	359
Totals	1,498	1,946
ARKANSAS		
January	594	261
February	482	449
March	611	740
April	713	672
May	671	656
June	280	457
Totals	3,351	3,235
CALIFORNIA		
January	2,304	1,718
February	3,918	3,235
March	3,611	4,406
April	3,549	3,783
May	3,389	3,859
June	3,299	2,719
Totals	20,070	19,730
COLORADO		
January	894	628
February	542	570
March	467	510
April	1,026	856
May	903	782
June	782	759
Totals	4,614	4,033
CONNECTICUT		
January	280	184
February	525	499
March	886	784
April	1,068	1,251
May	1,130	1,261
June	795	1,011
Totals	4,683	4,990
DELAWARE		
January	95	87
February	120	136
March	203	201
April	219	203
May	225	194
June	189	197
Totals	1,051	1,018
FLORIDA		
January	570	373
February	1,172	774
March	862	1,422
April	738	975
May	696	857
June	675	770
Totals	5,113	5,171
GEORGIA		
January	807	717
February	723	921
March	821	1,072
April	784	971
May	931	1,004
June	710	925
Totals	4,571	5,610
IDAHO		
January	175	102
February	231	115
March	386	248
April	452	349
May	455	267
June	256	523
Totals	1,955	1,605
ILLINOIS		
January	3,140	1,721
February	3,416	2,813
March	4,754	5,054
April	4,601	5,329
May	4,749	4,684
June	3,117	3,333
Totals	23,777	22,934
INDIANA		
January	1,330	939
February	1,664	1,715
March	3,060	3,386
April	1,854	2,910
May	2,228	2,672
June	1,324	2,093
Totals	11,460	14,215
IOWA		
January	1,251	738
February	1,723	1,353
March	3,091	2,423
April	3,578	2,997
May	3,183	3,215
June	2,670	3,289
Totals	15,496	14,020
KANSAS		
January	394	97
February	569	1,145
March	1,042	1,770
April	2,773	1,882
May	1,666	1,438
June	1,005	623
Totals	7,449	6,955
KENTUCKY		
January	843	702
February	847	763
March	1,192	1,425
April	1,545	1,627
May	1,332	1,539
June	935	143
Totals	6,694	7,599
LOUISIANA		
January	871	416
February	643	675
March	699	933
April	845	1,044
May	791	936
June	643	909
Totals	4,493	4,963
MAINE		
January	66	40
February	109	102
March	323	153
April	574	673
May	663	815
June	535	607
Totals	2,275	2,395
MARYLAND		
January	553	506
February	855	754
March	1,323	1,227
April	1,453	1,201
May	1,294	1,274
June	1,066	1,253
Totals	6,644	6,215
MASSACHUSETTS		
January	627	538
February	1,205	1,011
March	2,321	2,304
April	2,908	3,180
May	2,528	3,178
June	1,799	2,482
Totals	11,388	12,693
MICHIGAN		
January	2,201	2,843
February	2,457	3,703
March	3,647	6,112
April	4,341	6,059
May	4,082	7,432
June	2,463	5,236
Totals	19,191	31,435
MINNESOTA		
January	593	399
February	774	608
March	1,923	2,121
April	3,886	2,263
May	2,832	2,820
June	1,725	1,741
Totals	11,733	9,950
MISSISSIPPI		
January	452	346
February	639	605
March	931	907
April	1,097	937
May	893	936
June	765	797
Totals	4,777	4,519
MISSOURI		
January	779	710
February	4,911	3,096
March	5,182	4,577
April	3,232	3,296
May	2,539	2,267
June	1,393	2,215
Totals	17,736	16,799
MONTANA		
January	231	203
February	214	236
March	437	621
April	369	734
May	390	735
June	270	561
Totals	1,971	3,133
NEBRASKA		
January	1,377	839
February	1,207	1,136
March	1,237	1,400
April	1,520	1,791
May	1,399	1,553
June	1,310	1,135
Totals	7,950	8,000
NEVADA		
January	27	61
February	59	54
March	57	65
April	64	73
May	56	95
June	49	59
Totals	312	401
NEW HAMPSHIRE		
January	72	13
February	103	72
March	253	212
April	452	394
May	424	469
June	270	334
Totals	1,549	1,494
NEW JERSEY		
January	1,083	801
February	1,703	1,679
March	2,360	2,570
April	2,179	2,806
May	2,182	2,153
June	2,101	2,853
Totals	11,608	12,862
NEW MEXICO		
January	139	97
February	98	104
March	308	279
April	162	301
May	279	286
June	165	293
Totals	1,151	1,360
NEW YORK		
January	2,172	2,237
February	3,584	4,076
March	5,656	6,583
April	6,755	7,276
May	7,077	7,313
June	3,920	5,154
Totals	29,164	32,644
NORTH CAROLINA		
January	720	764
February	639	1,589
March	811	1,470
April	832	1,522
May	792	1,071
June	910	1,221
Totals	4,704	7,649
NORTH DAKOTA		
January	159	151
February	193	173
March	334	217
April	732	1,159
May	651	839
June	590	706
Totals	2,709	3,245
OHIO		
January	2,857	2,997
February	3,915	4,017
March	3,929	5,562
April	5,194	6,473
May	4,622	6,197
June	3,126	5,386
Totals	22,334	30,632
OKLAHOMA		
January	1,137	725
February	2,038	1,662
March	1,374	2,112
April	2,151	2,443
May	1,927	2,036
June	1,443	1,515
Totals	10,070	10,503
OREGON		
January	102	433
February	723	551
March	593	763
April	834	655
May	572	595
June	451	471
Totals	3,339	3,434
PENNSYLVANIA		
January	1,753	1,539
February	2,977	3,095
March	4,656	4,648
April	5,135	6,379
May	5,399	5,956
June	4,723	5,143
Totals	24,633	26,790
RHODE ISLAND		
January	62	44
February	242	182
March	475	356
April	424	535
May	448	586
June	332	524
Totals	1,983	2,227
SOUTH CAROLINA		
January	952	499
February	424	539
March	394	677
April	536	837
May	743	833
June	339	711
Totals	3,433	4,096
SOUTH DAKOTA		
January	492	328
February	555	351
March	579	593
April	587	797
May	586	663
June	645	962
Totals	3,444	3,694
TENNESSEE		
January	1,263	743
February	922	912
March	853	1,424
April	1,591	1,654
May	1,323	1,574
June	850	1,110
Totals	6,802	7,421
TEXAS		
January	4,179	1,799
February	3,566	3,099
March	3,702	4,400
April	4,007	7,099
May	3,355	4,872
June	3,131	3,828
Totals	22,530	25,097
UTAH		
January	131	104
February	140	187
March	309	394
April	413	426
May	316	559
June	324	345
Totals	1,363	2,015
VERMONT		
January	34	23
February	61	60
March	156	168
April	289	310
May	331	398
June	238	284
Totals	1,109	1,243
VIRGINIA		
January	954	566
February	1,020	786
March	1,444	1,604
April	1,440	1,461
May	1,711	1,547
June	1,498	1,491
Totals	8,067	7,424
WASHINGTON		
January	565	468
February	503	453
March	1,103	1,059
April	1,104	968
May	792	929
June	436	942
Totals	4,503	4,789
WEST VIRGINIA		
January	425	276
February	424	452
March	735	784
April	1,126	1,286
May	1,215	1,182
June	895	1,136
Totals	4,739	5,116
WISCONSIN		
January	1,006	531
February	1,178	883
March	2,423	1,234
April	2,402	3,081
May	3,523	3,473
June	1,663	2,589
Totals	12,353	2,077
WYOMING		
January	105	39
February	92	74
March	136	139
April	149	222
May	169	275
June	137	205
Totals	770	314
DISTRICT OF COLUMBIA		
January	102	123
February	289	283
March	556	481
April	470	455
May	486	455
June	431	376
Totals	2,385	2,113

FORD DEALER EQUALS ALL OF 1929 IN HALF YEAR

Jersey City, N. J., Aug. 23.—The Belle-Meade Sales Corporation of 2397 Boulevard, Jersey City, is displaying at the Stanley Theater the new model Ford tudor sedan.

George Chamberlain, president of the corporation, says that sales through the first six months of this year have more than equaled the entire sales for 1929. The sales of the new cars are approaching the 1,000 mark and the service department is running to capacity, servicing more than 100 Ford cars daily. The present indication is that there will have been 1,500 new Fords delivered by January 1, 1931.

STAGE CHEVROLET PARADE

Chicago, Aug. 28.—In connection with the Cook county economy contest being staged by Chevrolet dealers, a fleet of 200 Chevrolet sixes participated in a parade to stimulate public interest in the event. By the terms of the contest, cash prizes will be awarded to drivers who secure the greatest number of miles on a gallon of gasoline. In each case the start of the run is made from one of the Chevrolet dealer establishments.

ORME CHEVROLET SALES APPOINTED IN CHICAGO

Chicago, Aug. 28.—Appointment of the Orme Chevrolet Sales is announced by O. T. Miller, the Chevrolet zone manager, as dealer for this line of cars in the territory centering at Lake Park Avenue and 52d Street. Naming of the Orme organization serves to give Chevrolet representation in one of the thickly populated districts in the city. Thomas Orme, head of the company, has been identified as a Chevrolet dealer for a number of years.

SALES BREAKFAST

Newark, N. J., Aug. 28.—George Lackey, sales manager for the Foley Chevrolet Company, returned from his vacation at Lakes Wannamassa this week and called his sales force together for the "sales breakfast." The session started at 7.30, and in addition to a sales talk by P. R. Letts, the men enjoyed a breakfast, topped off by music and an exhibition of a clog dance by one of the members of the force. More than forty were present.

FORD SHOW ATTRACTS

New Brunswick, N. J., Aug. 28.—W. E. Mount & Son, Inc., 99 Albany St., announces the holding of the Ford Show at the Raritan Canal and Albany Street Bridge at Water Street this week. The show includes a number of interesting mechanical exhibits and marks the first showing here of the complete line of new Ford cars. A talking moving picture, "A Trip Through the Rouge Plant," is also being shown. The show is attracting considerable attention.

FORD OF CANADA SALES ON LEVEL WITH YEAR AGO

Toronto, Aug. 28.—Wallace R. Campbell, president of Ford Motor Company of Canada, Ltd., attending the Canadian National Exhibition at Toronto, said the company's sales this year were virtually on a level with last year.

Mr. Campbell expressed himself as vigorously opposed to the practice of reducing wages when business slumps. "The surest way the business man can assist in prolonging a period of business depression is to reduce the wages of his workers," he said. "Instead of reducing wages, Ford Motor Company of Canada increased the minimum daily wage of its workers from $6 to $7 when the first rumblings of the present depression were heard. We believe this the surest way to help business back on its feet, and we think our judgment was sound."

Automotive Daily News

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Allowances in 1930

IT is a somewhat difficult matter to obtain definite and accurate information on the internal conduct of any retail merchant's business. The man who is indulging in trade practices that are not exactly conservative will be the loudest in protesting that he is doing nothing of the sort. That is just every-day human nature.

In the retail division of the motor vehicle business the factor that has proved the undoing of most dealers who have failed is that of excessive allowances given on used vehicles taken in exchange. There is no question that in many cases in the past factories, in their anxiety for increased sales, have forced cars on the retail merchants to such an extent that the latter were forced to "trade their heads off" to keep from being swamped.

However, faced by the conditions that have existed during 1930, the automotive manufacturers very wisely dropped production to meet the facts in the situation. In a recent bulletin from the Department of Commerce, this state of affairs is commented upon as follows: "The industry wisely has made substantial reductions in output, thus enabling the dealer organization to cut down its inventories of both new and used models and provide a closer relation of stocks on hand to actual sales demand."

As a matter of fact, in July retail sales of motor vehicles probably exceeded production. Factory co-operation with the dealers in 1930 has been a real factor in preventing a worse debacle than we have had.

Another encouraging aspect of the used car business in 1930 is the evidence that we have that dealers generally are refusing excessive allowances on used cars. The retail merchants, not being overloaded, have realized that the mere sale of cars means nothing; that net profit is the final answer. If this lesson carries over into 1931 when the automobile business is going to be very much better than it is today, we shall have reaped a definite and permanent benefit from temporary difficulty.

Dealer Stocks

IN a recent issue of the Automotive Daily News there appeared an article which estimated stocks of new cars in dealers' hands at 350,000. This works out at about seven cars per merchant; under that figure rather than over it.

Undoubtedly the continuous reduction of dealer stocks has been the most encouraging symptom of the automotive year of 1930. After the orgy of overproduction last year, reduction of dealer stocks was the one condition most essential to revival of automotive business. The industry has shown wisdom in limiting its production so as to accomplish this end.

If this estimate of 350,000 vehicles in dealers' hands during August is as accurate as there is every reason to believe it is, the supply is not equal to the normal August production by the industry. Forgetting the fact that in August, 1929, with the debacle rapidly approaching, the industry turned out 512,000 vehicle units, let us turn to 1928 when production was on a normal basis. The output that month and year was 492,000 vehicles, almost 150,000 more than the present dealer stocks. In 1927, which was certainly not a boom year, the total output reached 322,000 units. In 1926 the month of August saw 442,000 vehicles built.

This vital factor of supply on hand continues to be entirely satisfactory, with potentialities for immediate profits, when general business revival begins.

Ask Us to Tell You—

IN THIS service department, The Automotive Daily News is actuated by the desire to help readers solve their problems, whether these are merchandising, technical or in the field of general automotive information. We shall be glad to have our readers ask us any questions pertaining to the automotive field.

In some instances readers may desire information which will require an expenditure of money to secure, and in such cases we shall be glad to get the desired data at the least posible cost, or shall inform our readers where they may obtain it most economically and expeditiously.

In cases where the reader desires an immediate reply, we would suggest he inclose a self-addressed and stamped envelope.

EZRA CLARK LIKES THE BELOW EDITORIAL

Automotive Daily News: I have read and become greatly interested in an article "On Being Licked" in the Thursday, August 21, issue of your publication. Would you be so kind as to send me a dozen copies of same?

The article has a trend of thought that is one not to be taken lightly by any man.

EZRA W. CLARK,
Vice-President Clark Tructractor Company, Battle Creek, Mich.

INCREASES BUSINESS BY HARD WORK

Automotive Daily News: The Automotive Daily News is always interesting to us, but every little while you bring something our way which strikes us just a little bit better than ordinarily.

Your editorial "On Being Licked" hits the nail so squarely on the head that we would like to have permission to reprint this on one of our bulletins, with credit for same being passed to The Automotive Daily News.

Our own experience this year is that we are doing the best business of our history, but we assure you that we don't think there is any accident about it, or do we consider ourselves lucky.

It is the result of hard work and trying to be on our toes. If we had a way of keeping our distributors on their toes, we don't think there would be nearly so much talk about depression and poor business.

J. F. MARTIN,
Bellevue Manufacturing Company, Bellevue, O.

WHY JUSTICE OF BUFFALO INCREASED HIS BUSINESS

Automotive Daily News: I certainly want to congratulate your management on the great amount of good that you are doing editorially and otherwise in your good publication, The Automotive Daily News.

I have just read the editorial in your August 21 issue under caption "On Being Licked," and another of your strong editorials was under the heading "The Dealers' Year." I quite agree with you on your editorial "On Being Licked"—that business to the largest degree is influenced by good hard work and perspiration.

As a distributor for Chrysler and Plymouth motor cars, and incidentally an ex-director of sales of the Chrysler Sales Corporation, I have found that there is no substitute for hard work, and that one's results, good, bad or indifferent, are mainly because of mental attitude plus an intelligent effort to do the job.

I am attaching hereto a statement over the signature of Ernst & Ernst, national auditors, and which shows an increase in our business for our principal selling months just past, namely, March, April, May, June and July, of 56.47 per cent. in new cars delivered, retail and wholesale, against the like period of 1929. In addition, our net dollar sales volume as well shows an increase in this period of 13.89 per cent., together with a proportionate increase in our net profits. In the same period, Erie county registrations on Chrysler alone show a 7.2 per cent. decrease, which is 20.9 per cent. less than the total decrease of all other makes, and which is, as records will show you, 28.1 per cent.

I have been asked by my banker and others for reasons why we should show an increase in our volume against a decrease in nearly all other lines of business, and the things I lay it to are the product, of course, plus hard work, long hours, more contacts of customers and prospective buyers, less golf and more attention to business. In this regard, I have very capable assistants and have full confidence in their ability, obtained through experience; but I have found that the boss being on the job has a certain very beneficial effect, and this is further exemplified in the figures shown in Ernst & Ernst's statement. I do not care to give you the impression that I am working to an extent where I do not obtain any fun out of life, or to an extent where it is having any effect on my physical condition, for I still play a couple of games of golf each week, but which, I might say, has been cut down at least 50 per cent. of the number of games played last year. As a result my game of golf is worse, but I am thankful to say my business is better.

In this organization we positively "taboo" any talk of business depression, unemployment, Wall Street crash, bread lines or other negatives, and, while I might say that this is a very difficult thing to do, we are working enthusiastically and ambitiously, and through this have developed a positive condition of mind.

There are many things to be ironed out in our industry, and this is being rapidly done by the manufacturer as well as the individual dealer, so my opinion is that in the future, particularly after the period of our usual winter decline, the sale of motor cars will be more profitable for all concerned than at any time in the past.

ROY JUSTICE, President,
Justice Motor Corporation, Buffalo, N. Y.

WORTH REPEATING

DUE to the unusual number of requests from its readers, Automotive Daily News is pleased to repeat, herewith, the editorial which it published on August 21, referred to above. The editorial is as follows:—

On Being Licked

WE had occasion recently to visit a number of automobile dealers in the Eastern section of the country. In the course of a single afternoon we made five calls. In three of the offices we received invitations to go out and play golf and in the fourth the boss suggested a view of the yacht races that were being held nearby that day. All these dealers advanced as a reason for golf or yachting the fact that "there isn't any business, so what's the use in sticking around on a nice afternoon?"

In the fifth office we found a dealer in his shirtsleeves and about as busy as a man would care to be on a hot day. The only invitation we received from this dealer was one to look over his sales records for the year to date. He was extremely proud of the fact that his 1930 sales were only a few units behind his 1929 level. "And we're going to beat the record before the year is over," this energetic person assured us.

We asked him how he had been able to do so well in a year that is just as much subnormal as 1929 was supernormal. "That's easy," he answered. "We've all worked about twice as hard. My boys are all on their toes every hour of every day. They are ringing door bells from 10 to 5, and you would be surprised how many sales they are making among people who had made up their minds not to buy a new car this year. The whole credit for our showing is due to the boys; every man of them is working just about twice as hard as he did last year."

There is a whole lot of food for thought in that statement. The human tendency is to take it for granted that you are licked when a bad year comes along, and begin looking forward to "a break." But the man who will resist the temptation to follow the line of least resistance and "take it lying down," the man who will fight hard times instead of yielding to them, will make every year a good one.

G. M. EUROPEAN SERVICE MANAGER RETURNS TO N. Y.

New York, Aug. 28.—J. E. Loveland, regional service manager for Europe for the General Motors Export Company, returned recently to take over the duties of assistant general service manager in the New York office. W. R. Belding, former assistant general service manager in New York has taken over the duties of regional service manager for Europe. Before returning to America Mr. Loveland and Mr. Belding made an extensive tour of Europe studying the service situation.

COMING EVENTS

SEPTEMBER

22-26—Chicago, Ill. American Society for Steel Treating meeting at Stevens Hotel.
29-Oct. 4—Pittsburgh, Pa. National Safety Council Annual Safety Congress.

OCTOBER

2-12—Paris, France. Automobile Salon.
6- 7—Reading, Pa. Pennsylvania Automotive Association Convention.
6-11—Washington, D. C. Sixth International Road Congress.
6-11—Washington, D. C. American Roadbuilders' Association Convention.
7- 8—Detroit, Mich. Society of Automotive Engineers production meeting at Book-Cadillac Hotel.
14-15—Syracuse, N. Y. New York State Dealers' Association Convention.
16-25—London, England. Olympia Motor Show.
22-24—Pittsburgh, Pa. Society of Automotive Engineers transportation meeting.

NOVEMBER

4- 7—Chicago, Ill. National Tire Dealers' Association Convention.
6-16—Berlin, Germany. International Automobile Show.
8-15—Chicago, Ill. Automobile Salon at Drake Hotel.
10-14—Cleveland, O. Motor and Equipment Association Show.
13-23—Paris, France. Commercial Vehicle Salon.
17-21—Cleveland, O. National Standard Parts Association Show.
30-Dec. 6—New York. Automobile Salon at Hotel Commodore.

DECEMBER

6-17—Brussels, Belgium. Automobile Exhibition.

JANUARY

3-10—New York. National Automobile Show.
24-31—Chicago, Ill. National Automobile Show.

S. A. E. Holds Symposium on Aircraft Fuels

Closing Meeting of S. A. E. Held at Chicago

CHICAGO, Aug. 28.—Today the technical sessions of the eighteenth national aeronautic meeting of the S. A. E. were completed with a symposium on aircraft fuels by members prominently associated with government departments, aircraft engine research and oil refining companies.

The text of several of these papers is given in part in this issue.

FUEL REQUIREMENTS FOR USE IN AIRCRAFT ENGINES

S. D. HERON, Power Plant Branch, Material Division, Air Corps, U. S. A.

The requirements of fuel for aircraft engine use, from the viewpoint of the material division of the army air corps, may be briefly considered under the following headings:

1. Anti-knock value.
2. Volatility.
3. Vapor-locking and starting properties.
4. Gum.
5. Available fuels and anti-knocks.

1. There is little question that the anti-knock value is the most important property of a fuel for use in a spark-ignition aircraft engine. Fuel deficient in anti-knock value for any given engine will result in rapid failure of the cylinder unit as a result of stuck and melted pistons, overheated and burnt-out exhaust valves, and spark plug overheating, which at times results in melted insulators.

The fuel required depends upon the design of the engine, the compression ratio, the degree of supercharging the design, size and temperature of the cylinder unit, and the rate of revolution.

Until recently, Mid-Continent Domestic Aviation Gasoline, having an approximate anti-knock value of 50 octane (2-2-3 tri-methyl pentane) 50 heptane, has been the most generally used American aircraft-engine fuel. Provided the engine output is kept within the limitations of this fuel, it gives excellent results, but fuel is not suitable for many modern military or commercial engines if they are flown wide open at sea level. Mid-Continent D. A. G. is inferior in anti-knock value to much of the low-test automobile gasoline on the market.

For most modern commercial and military engines, with the exception of high-compression and ground-boosted types, fuel having an approximate anti-knock value of 70-75 octane, 30-25 heptane is amply good enough, with certain reservations as to fuels which show excessive loss of anti-knock value at high cylinder-temperature. This anti-knock value is roughly that of premium automobile gasolines of the cracked and doped types.

For high-performance engines of the ground-boosted high-compression and high-cylinder-temperature types, the Air Corps has the present intention of standardizing an anti-knock value of 87 octane 13 heptane.

The relative anti-knock values of fuels for aircraft purposes appear to vary widely with test-engine conditions, at least when tested by the method of working at part throttle and a pronounced knock. The most pronounced change in relative values is produced by variation of cylinder temperature, particularly when comparing lead and benzol in highly napthenic California gasolines. In measuring detonation by the tendency to heat the cylinder unit, the Material Division has found that the amount of tetraethyl lead required to equal 50 per cent. benzol in a California Fighting Grade Gasoline varies by several hundreds per cent. between the limits of 200 and 400 deg. Fahr. cooling-liquid temperature, the lead requirement rapidly dropping with increasing jacket temperature. Similar tests of lead and benzol in an average Mid-Continent D. A. G. showed that, between the limits of 150 and 400 deg. Fahr. jacket temperature, the lead equivalent of 50 per cent. benzol varied by over 100 per cent. Using a similar California gasoline, the same Mid-Continent D. A. G. and benzol, the same engine equipment and measuring detonation by both temperature and bouncing-pin methods, the Ethyl Gasoline Corp, and the Standard Oil Development Co. have found that, at 350 deg. Fahr. jacket temperature, the lead equivalent of 50 per cent. benzol is subject to more than 100 per cent. variation, both as a result of change of rate of test-engine revolution and of knock intensity.

Failure of an aircraft engine as a result of the use of fuel of insufficient anti-knock value is almost entirely always the result of overheating of the cylinder unit. There is evidence that the relative tendencies of fuels to knock audibly and their tendencies to heat the cylinder unit are not always equal. Therefore, a temperature method of rating fuels for aircraft use may prove to be more desirable than one depending upon intensity of knock. Thus, the problem of rating aircraft fuels may prove to be distinctly different from that of automobile fuels, and investigation of this problem seems to be desirable. In this connection, some evidence is obtained in multi-cylinder aircraft engines which suggests that tetraethyl lead has an effect in suppressing overheating of the cylinder unit which is out of proportion with its properties of suppressing audible knock and controlling the rate of pressure rise.

As aircraft engines vary vastly as to cylinder temperature and rate of revolution, the problem of measuring the anti-knock value of fuels for aircraft use in terms of their usefulness in multi-cylinder engines is very complex. For its solution, it seems probable that a variety of types of multi-cylinder engine must be tested with a variety of base fuels, the amount of anti-knock material necessary in each fuel for optimum performance being determined. Fuel test-engine conditions and possibly a test-engine type must then be obtained which, on the average, match the average results obtained in multi-cylinder engines.

While anything like a complete knowledge of the relative behavior of different fuels in multi-cylinder aircraft engines and fuel-test engines is probably several years off, a test which provides partial control of anti-knock value is preferable to no test at all. Therefore the Air Corps, in its recently issued tentative Specification Y-3557 for Fighting Grade Anti-knock Gasoline, has specified test conditions in accordance with its best present judgment, conditions being set so as not to

(Continued on Page 7)

Anti-Knock Values Found In Fuels for Aviation

E. E. ALDRIN,
Aviation Manager of Standard Oil Company of New Jersey

There has been considerable debate regarding relative knock values of various aviation fuels. The difficulty lies largely in not having a common language and uniform condition for test. Much progress is being made in rectifying this by various committees working with or associated with the Society of Automotive Engineers and the petroleum industry represented largely by the American Society for Testing Materials. Testing of various aviation engines in the laboratory and in flight on different kinds of fuels has given certain data which I am attempting to depict in graphical form. This represents my own personal system of clarifying the information I had accumulated up to a few weeks ago.

It is obvious to those who have studied the subject that it is very nearly impossible to compare the effect of fuels in water-cooled and air-cooled engnes, whether they be full scale or fuel testing engines. In fact we have checked with many other testing laboratories that some of the fuels give quite different values when tested at 300 degrees instead of 210 degrees in the Ethyl Gasoline Knock Testing Engine just as in air cooled versus water-cooled engines in flight. Specialists on knock testing will certainly be able to point out plenty of faults with the tabulation I present. In fact I can criticize it very severely myself, but I have not yet hit upon a better method of presentation of the facts available and would appreciate constructive criticism in this connection. I shall outline some of my own criticisms of this tabulation and then ask for questions from the audience to guide me in explaining some of the details which might not be clear.

Straight-run fuels are fairly accurately represented.

The benzol values shown are for 210 degrees or water-cooled engines; for 300 degrees or higher cylinder temperatures its effect is reduced.

Cracked fuels generally fall to a considerably inferior position when tested at 300 degrees instead of 210 degrees.

Better anti-knock fuels (with knock rating 5. (S. O. N. J. scale) or less, may not be worthy of as comparatively a favorable position as was found for them on the water-cooled test engine when they are tested on full scale air-cooled engines which would come between those shown on the chart, especially if they are cracked or contain benzol.

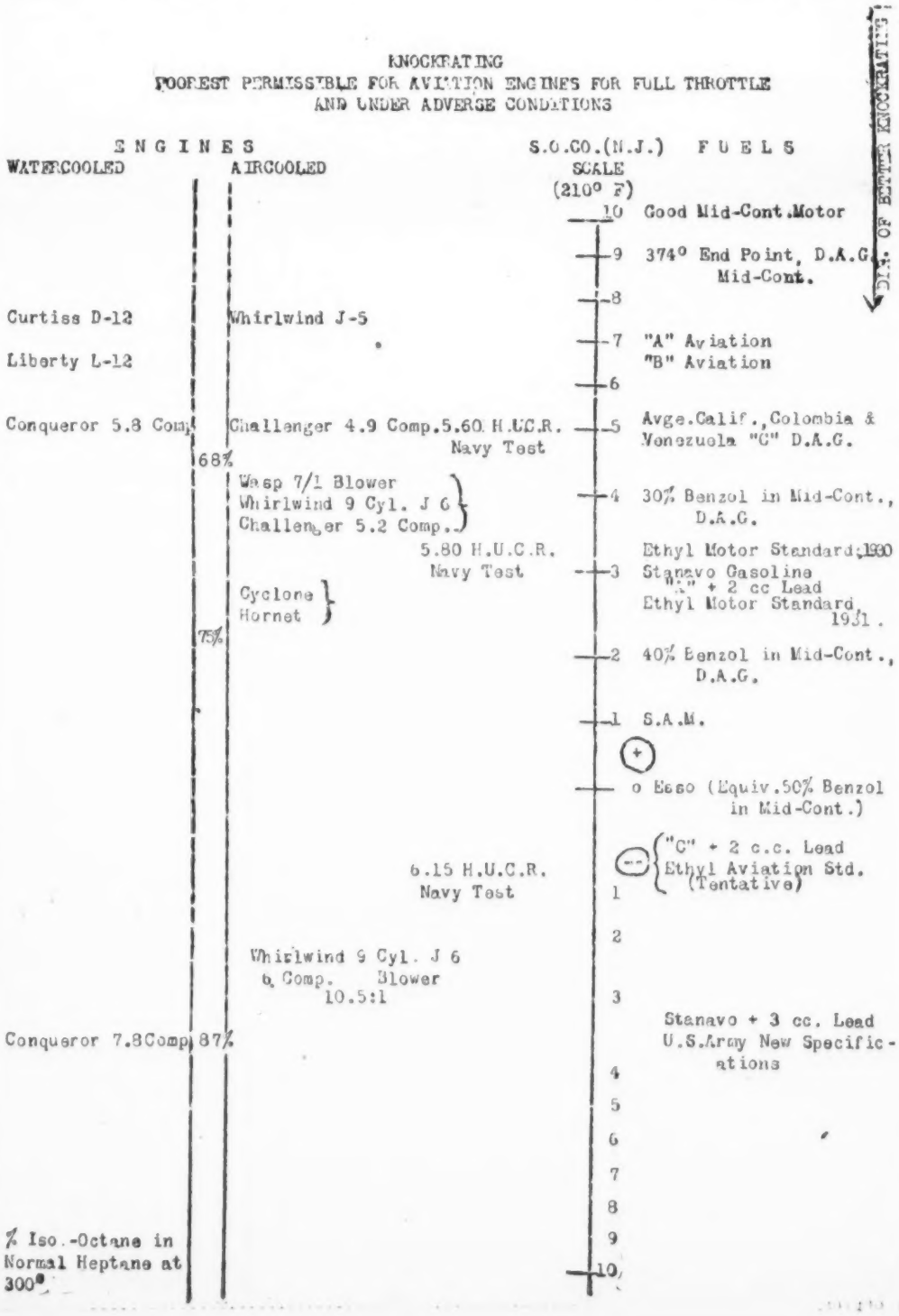
No exact marks are made on the scale because of reason indicated above and of the experimental error.

In testing fuels at 300 degrees we find all the "bad blood" greatly exaggerated in spite of dopes added. In other words, as cylinder temperatures are increased the effect of dope added to a poor base gasoline is less and less.

I have avoided the question of relative cylinder head temperatures in the various engines shown. The criterion in the full scale water-cooled engines has been cylinder head temperatures. In the full scale air-cooled engines the criterion has been largely drop of power and audible knock. In the Navy Variable Test Engine audible method has been used. In the Standard Oil Co. of New Jersey Scale Tests Midgley Bouncing Pen has been used.

Whatever the defects of the chart, it has been my experience that fuels equal or better in knock rating than those indicated will be quite safe under the worst conditions.

The importance of knock value in aviation engines cannot be overestimated. The better the knock value, generally speaking, the lower the cylinder temperatures and therefore better lubrication can be maintained, with a net result that one has engines which will last longer between overhauls, which will allow of reasonable oil consumption, and a multitude of other related advantages. Such questions as have been up for discussion previously have not been considered at this time such as the vapor pressure of the fuel because I believe that it is of secondary importance and sometimes greatly exaggerated, until more practical experimental evidence has been obtained.



STOCKS OF GASOLINE DECREASE; OUTPUT UP

New York, Aug. 28.—Stocks of gasoline, reported to the American Petroleum Institute by refineries representing 95.6 per cent. of the country's total refining capacity, decreased 1,410,000 barrels in week ended August 23 to 39,842,000 barrels. Total at week's end was the lowest since the week ended December 14 last, and was 2,118,000 barrels less than stocks at the close of 1929. In corresponding week of last year gasoline stocks decreased 1,532,000 barrels to 32,397,000 barrels.

Crude oil run to stills by these refineries, operating on a 72.4 per cent, basis, averaged 2,551,600 barrels daily last week, decrease of 11,100 barrels from previous week's daily average, when refineries were 72.6 per cent, operated.

CLARK

CLARK AXLES and METAL WHEELS

fulfill the rigid requirements of the larger truck and passenger car manufacturers. Built in a plant with large production capacity.

CLARK EQUIPMENT COMPANY
Buchanan Michigan

AXLES
Front & Rear
WHEELS
Single or Dual Tire
CAST STEEL HOUSINGS
TRANSMISSIONS

New England Railroads Planning Bus Expansion

NEW YORK, Aug. 28.—Plans for further drastic changes in the handling of passenger traffic by the railroads of New England are now in the making, it was learned yesterday, and important announcements to this effect are expected in the next several months.

The movement is signalized by the recent discontinuance of nearly 100 trains on the New Haven system and the substitution of bus service by the company, together with the appointment of Paul W. J. Smith, a recognized expert in motor coach transportation, and until July 1 general superintendent of the New York, Westchester & Boston Railway, as head of the New Haven's motor coach division.

The futility of maintaining short-line trains in the face of growing bus competition, and the more flexible and economical service which the buses give, is now a recognized principle with many of the directors of New England roads, an official in close touch with the situation said. The railroads particularly concerned include the New Haven, the Boston & Maine, the Maine Central and the New York, Westchester & Boston.

The New Haven, through its subsidiary, the New England Transportation Company, already has 230 buses operating on regular schedule, the total revenues from this source being nearly $3,000,000 in 1929. The road has long been a leader in the field and its methods have been studied and widely copied by rail officials from all sections of the country.

Mr. Smith, the new chief of the New Haven's motor fleet, made a notable record in the development of scheduled bus service while connected with the Westchester road and its motor coach subsidiary, the County Transportation Company.

The Boston & Maine Railroad, also a pioneer in he use of buses by the carriers, has extended its motor coach line into network covering the entire territory served by the road. The business is handled through the Boston & Maine Transportation Company, operating subsidiary of the railroad. Besides the every day scheduled runs of the B. & M. buses, sightseeing motor tours and excursions are promoted to points of interest in the company's territory. A total of 2,138,000 highway miles were covered by the passenger coaches in 1929.

E. S. French, president of the Boston & Maine, states the present attitude of his company after five years of experience in co-ordinated rail and highway service as follows:

"We believe that with the growing popularity of the private automobile, more branch line passenger services will have to be converted to motor coach operation. The motor coach will be used to a greater extent to relieve through passenger trains of local stops.

"We feel that the public looks upon the use of highway service by the railroads as an evidence of our being alert and ready to meet new conditions with new tools. There has been reluctance to lose rail passenger service to the motor coach service, but there is a growing recognition that it is inevitable and the only means of continuing organized transportation service to some communities."

A. R. JOHNSON IS NAMED BEMENT CHICAGO MANAGER

Detroit, Aug. 28.—A. F. Bement, president of Austin F. Bement, Inc., Detroit and Chicago advertising agency, announces that C. C. Loveless, for three years manager of the

WM. C. GRUNER OF BUICK TRANSFERRED TO PEORIA

Chicago, Aug. 28.—William C. Gruner, service manager for the Buick Motor Company branch here, has been transferred to Peoria, Ill., as a territory block traveler for the sales promotion department of the same company. Mr. Gruner has for

agency's Chicago branch, has resigned effective July 31 to join Howell, Inc., general advertising and merchandising counselor, Chicago, as account executive. As of the same date, A. R. Johnson, chief account executive with the Chicago office of Austin F. Bement, Inc., for the past two years, has been made manager, and W. L. Baccus has

WISCONSIN AXLES

Maintenance costs are cut to the bone—reliability attains a new standard of comparison—where trucks and buses are equipped with Wisconsin Axles.

WISCONSIN AXLE COMPANY
Oshkosh, Wisconsin

Cumulative New Commercial Car Registration Statistics, July, 1930

Returns for Today: Alabama, Louisiana, Maryland, Michigan, North Carolina, Oregon and Washington.

States	Autocar	Brockway-Indiana	Chevrolet	Diamond-T	Dodge	Essex	Fargo	Federal	Ford	G. M. C.	International	Mack	Paige	Relay	Reo	Republic	Rugby	Sterling	Stewart	Studebaker	Whippet	White	Willys	Willys-Knight	Miscellaneous	Totals	States
Alabama			136		1			1	178	5	4	2			3							2	1		1	334	Alabama
Arkansas		2	236		4		1		310	6	38	1			1						2	6			1	608	Arkansas
Conn.	2	9	109	7	32	2		5	216	16	21	20	2	1	18			2	14	4		3	1	1	11	496	Conn.
Delaware	1	2	32		2				56	7	6				1				1		1	1	1			111	Delaware
Florida		7	99		3	1			233	2	19	3			3		1					5	2			378	Florida
Idaho			52		8				92	13	12				4	1	1					1	1	2	2	189	Idaho
Illinois	5	16	516	41	50		2	14	874	34	110	17	2		19	2		8	1		8	21	21		60	1821	Illinois
Louisiana			135		4				220	6	18	2			2		1					6			7	401	Louisiana
Maryland	5	8	105	11	6		3	1	244	5	22	20			4	2		2	6	2		16	1	1	5	469	Maryland
Michigan	1		213	4	19	1	2	18	725	22	48	5	1		19	4	4	3	3	1	4	6	8	2	15	1128	Michigan
Minnesota		3	255	11	22	1	7	4	502	21	94	2	1		18		1			1	5	2	21		11	982	Minn.
Missouri	5	8	269	9	25	1	3	4	358	14	70	13	3		8		1	2	1	1	5	2	3		17	822	Missouri
Montana			68		3	1	1	1	123	3	33				5		1				2	1	1			243	Montana
N. Hamp.		1	39	5	6				121	4	5	7			5		2		1	1		1	1		3	202	N. Hamp.
N. Carolina	1		224	1	11		3	3	364	4	14	2	2		2						1	2	6		4	644	N. Car.
N. Dakota			50	3	2		1		74	1	46				5		2						2			186	N. Dakota
Oregon	4		117		14	5	1	11	417	15	38	17	1		7	3	5	4		3		14	2	2	21	701	Oregon
Rh. Island	3	3	41	2	4		2	1	124	9	5	1			3			1	1	1		2				203	R. Island
S. Carolina		1	125					2	171	3	10											1			12	325	S. Car.
S. Dakota		3	71	6	7		1		126	3	50				5		1				2		5		1	281	S. Dakota
Utah			48		4		1		127	4	6	1			1										4	196	Utah
Wash'ton			203		13		4		443	33	45	7			13		7	2		2		20	4		34	830	Wash'ton.
W. Virginia		6	144	3	17			2	202	17	42			3	8	1	3			2		2	4		8	464	West Va.
Wisconsin		8	564	23	40	2	4	11	784	37	125	4		2	23			4	8	4	9	3	24	1	21	1701	Wisconsin
Dist. of Col.	5		27	3	2				105	6	7				1			1				3			5	165	D. of Col.
Totals	32	77	3878	129	299	14	36	78	7189	290	888	124	12	6	178	13	30	29	36	22	39	120	109	9	243	13880	Totals
Ala., 1929		2	386		12		1	1	254	1	25				1						13	6			2	704	Ala., 1929
Ark., 1929		5	400		26		8		513	12	83	1			4		1			4	15	3			11	1086	Ark., 1929
Conn., '29	5	9	161	15	52		3	8	234	27	33	48		5	43		1	1	15	3	13	6		4	14	700	Conn., '29
Del., 1929	2	1	57		4				67	10	10				1						1			1		154	Del., 1929
Fla., 1929		3	168		19				351	10	17	1			8					2	3	7				589	Fla., 1929
Idaho, '29			75	1	10		2		64	5	10				10		2				2	4			2	187	Idaho, '29
Ill., 1929	12	14	791	33	159		27	12	1149	49	195	31		2	46	1		10	3		51	23			124	2787	Ill., 1929
La., 1929		6	326		18				386	14	70	7			3						4	5		1		840	La., 1929
Md., 1929	17	6	179	7	23		2	2	282	19	51	15			28		1	3	3		5	15		1	25	689	Md., 1929
Mich., '29	3	4	621		85		8	29	1303	92	108	16		3	69	4	3			1	41	5		3	31	2429	Mich., '29
Minn., 1929			339	3	48		8	11	471	28	95	4			25		1			4	26	15			20	1098	Minn., '29
Mo., 1929	4	6	325	12	53		5	2	431	31	48	14			14	1	1	3		2	26	5			5	988	Mo., 1929
Mont., 1929			51		12		2		131	4	27				4	1	1			2	3	4				242	Mont., '29
N. H., 1929	1	6	71	1	13		1	2	133	9	15	3			12		1	1	1	1	3	2			1	282	N. H., '29
N. C., 1929	2	3	461		50		6		495	15	25	7			2	1			3	3		8			10	1091	N. C., 1929
N. Dak., '29			100	1	13		5	1	93	5	70				2						1				2	298	N. D., 1929
Ore., 1929			312		30		6	14	437	22	61	13			23	1	12	8		2	8	12			17	978	Ore., 1929
R. I., 1929	3	1	68		26		1	2	88	17	6	13			29		3	4	5	2	3	3			5	279	R. I., 1929
S. Car., '29		16	200		9		10	3	224	5	12	2			1	1	1		1	1	4	2			4	496	S. C., 1929
S. Dak., '29			203	1	19		2	1	175	12	103	1			12		1			3	10	1		1	2	547	S. D., '29
Utah, 1929			53		13				101	8	7				5		2			1	2					192	Utah, '29
Wash., 1929			337		48		11	5	580	23	71	8			29	3	11			5	15	24		1	40	1211	Wash., '29
W. Va., '29		8	202	3	45		2	3	260	18	48			2	16	1	1		5	3	5	5		1	7	635	W. Va., '29
Wis., 1929	1		499	15	64		10	8	746	39	121	5		2	54		3	17	8	2	35	8		1	24	1662	Wis., 1929
D. of C., '29	1	2	35	5	2				137	6	4	1			4				2		3	14			3	219	D. C., '29
Totals	51	92	6420	152	863	*	120	104	9110	481	1315	190	*	14	445	14	46	47	46	41	292	177	*	14	349	20383	Totals

*Not in production at that time.

S. A. E. Holds Symposium on Aircraft Fuels

Fuel Requirements for Use in Aircraft Eengine

(Continued from Page 5)

bear unduly on cracked and aromatic blend bases.

Incidentally, the experience of the Material Division is that knock testing at high cylinder-temperatures is as yet by no means an easy procedure, for the following reasons:

(a) Any suitable liquid for high-temperature cooling is extremely difficult to exclude from the combustion-chamber if a detachable head with liquid passing the gasket be used. The slightest leak causes rising and falling knock and precludes any accurate testing. This difficulty with leakage of high-temperature cooling media is not by any means confined to fuel-test engines.

(b) The slightest amount of oil pumping produces effects similar to (1).

(c). The results seem to be much more affected by slight changes of air-fuel ratio than they do by addition of anti-knock compound to a given fuel. Therefore a relatively insensitive carbureter that not merely maintains the same air-fuel ratio from cycle to cycle over a short period, but also maintains a practically constant average mixture-ratio over extended periods of running, is necessary.

In this connection, the Ethyl Gasoline Corp. has found that at 212-deg Fahr. jacket temperature, aviation gasolines are a great deal more sensitive to change of carbureter-float level than are motor gasolines. Using a similar test engine, the Material Division has found that, at 300-deg. Fahr. jacket temperature and otherwise similar test conditions, California Fighting Grade Gasoline, with and without lead addition, is roughly four times as sensitive to change of carbureter-float level as is Ethyl Gasoline Motor Standard Reference Fuel.

This sensitivity to float level in the case of the Series 30 Ethyl gasoline engine is, in the experience of the Material Division, roughly reduced to one-fourth by increase of engine rate of revolution from 600 to 900 r.p.m. at jacket temperatures of 300 and 350 deg. Fahr.

(d) At low test-engine speeds, the engine takes an excessive time to reach stability when switching from one fuel to another.

(2) For minimum fuel consumption without excessive heating of the induction system and consequent power loss, D. A. G. does not appear to be volatile enough. Therefore the Air Corps has, in Specification Y-3557, which is for use in super-performance engines, adopted Federal Fighting Grade volatility requirements with the substitution of a 10-per cent-evaporated point for the present 5 per cent.-recovered point. Fuel-injection devices now undergoing test and injecting either into the combustion-chamber or the induction system may allow of the use of less volatile fuel than D. A. G. without power drop or distribution troubles.

(3) Vapor-locking is an intermittent trouble with present Air Corps equipment, and gasoline with a 10 per cent.-evaporated point much below 150 deg. Fahr, violently accentuates the trouble. Very little of the D. A. G. obtained by the Air Corps has in the past had 10 per cent.-evaporated points below 150 deg. Fahr, or in excess of 160 deg. Fahr. Specification Y-3557 has, therefore, adopted the limits of 144-162 deg. Fahr. for the 10 per cent. point and the lower limit can hardly be lowered until fuel systems are improved. A recent case of vapor-lock trouble was traced to the use of natural gasoline meeting all the Federal specification requirements for Domestic Aviation Gasoline, the 10 per cent.-evaporated point being 137 deg. Fahr. and the Reid vapor presure 7.8 lbs. at 100 deg. Fahr.

Even if the fuel systems are improved so as to allow of reducing the lower temperature-limit for the 10-per cent. point, it is possible that any considerable lowering will be undesirable on account of fuel boiling in the tanks of supercharged airplanes, which may reach 30,000-ft. altitude in 20 min. with virtually no reduction of temperature of the fuel in the tanks.

The Bureau of Standards has shown that in propane-free gasolines the 10-per cent.-evaporated point gives a very close estimate of the vapor-locking temperature of the gasoline at 760 mm. Hg. pressure. Apparently the Air Corps is receiving some gasoline containing propane, as the Reid vapor pressure at 100 deg. Fahr. of samples of D. A. G. with almost identical 10-per cent-evaporated points is differing by as much as 1½ lbs. per sq. in.

It is probable, therefore, that Air Corps Specifications Y-3557 and 2-40F for Domestic Aviation Gasoline (differing from the Federal Specification only in that it specifies a critical temperature of solution with aniline) will be modified to provide an upper limit of temperature (probably increased to 167 deg. Fahr.) for the 10 per cent.-evaporated point and a maximum Reid vapor pressure; the latter is unlikely to be set in excess of 6.5 lbs. per sq. in. at 100 deg. fahr.

An upper temperature limit of 167 deg. Fahr. on the 10 per cent. point will provide considerably better control of starting quality than that now given by the limits of 122-167 deg. Fahr. for the 5 per cent. recovered point in the Federal Domestic Aviation Gasoline Specification.

(4) While cracked gasoline has been little used for aircraft engines, there would seem to be little reason for excluding it without extensive carried out endurance tests in flight tests. The Material Division has with cracked aviation Ethyl gasoline and found no undesirable effects from the use of a cracked base. The fuel used in these tests was admittedly low in gum (below 10 mg. glassdish after accelerated aging with oxygen) and quite gum-stable. Several gum-stable cracked aviation gasolines of high anti-knock value from a variety of sources have been tested by the Material Division. From the standpoint of supply of anti-knock aviation fuels, it seems that service testing in flight of cracked gasolines should be encouraged.

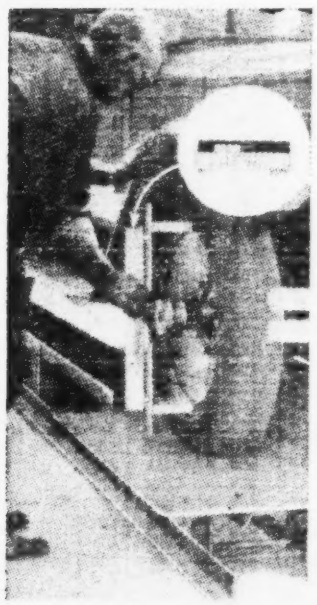
The present Federal specifications of 3 mg. of copper-dished gum for aviation gasolines virtually exclude all cracked gasoline (and are not very generally met by much of the straight-run fuel in use), and a glass or porcelain-dish requirement appears to provide no control of gum-stability. The Material Division has tentatively specified an accelerated aging test with oxygen in Specification Y-3557 and is financing an investigation of the relation of accelerated aging tests with storage conditions at the Bureau of Standards. This investigation by the bureau would appear to be of such fundamental importance to the oil industry at large that it should be supported by the industry and its financing not be left to the Air Corps alone.

(5) Ample supplies of Fighting Grade Gasoline with an approximate anti-knock value of 70-75 octane, 25-30 heptane (at high cylinder-temperature) of both gum-stable cracked and straight-run types seem to be available. Most of the straight-run stock available is, as far as the experience of the Material Division goes, of California origin.

When anti-knock values of the order of 87 octane, 13 heptane are required (measured at high cylinder temperature), use of tetraethyl lead and aromatics for addition to such bases seems to be the best present method. Benzol, which appears to be relatively ineffective at high cylinder temperature, cannot be used in concentrations much in ex-

(Continued on Page 11)

Manley Manufacturing Adds New Camber Gauge



Reading degrees of camber on Duby-Manley gauge

The Manley Manufacturing Company, Bridgeport, Conn., is now marketing the Duby-Manley camber gauge to facilitate the accurate checking of the vertical tilt of the wheels. The gauge operates on the balanced lever principle.

The use of this new gauge is illustrated in the accompanying photographs. The hub height of both front wheels is measured in order to be sure that both front wheels are on the same level. The two contact points of the gauge are then placed on the rim of the wheel and the degrees of camber measured by a small level on the gauge.

The net weight of the gauge is 5½ pounds. The price is $15.

Bickett Rubber Products Makes Tite-Grip Channel

Bickett Rubber Products Corporation, Watertown, Wis., has just developed a new rubber window channel known as Tite-Grip.

The new product is especially

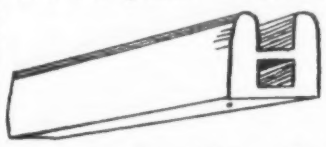


Fig. 1. Tite-Grip rubber window channel

adapted for use on motor vehicles and is constructed to receive a movable glass panel and provide a substantially weather-proof contact.

As shown in the accompanying illustrations, the parallel side walls

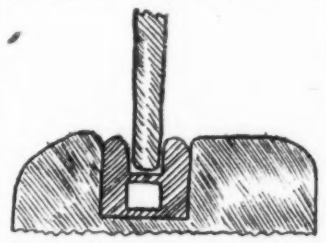


Fig. 2. Section showing Tite-Grip window channel with glass below transverse wall

are relatively thick and connected along one of the longitudinal edges with an intermediate wall of approximately the same thickness as the first transverse wall. The intermediate wall is located approximately midway between the longitudinal edges of the side walls so as to form a closed chamber and an opening groove. The groove re-

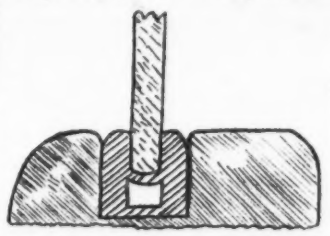


Fig. 3. Section showing clamping action of window channel when glass contacts with trasverse wall

ceives the edges of a glass panel and as the panel contacts with the intermediate wall, the flexibility of this wall causes the edges of the side walls to grip the glass. Tite-Grip can be made in any shape or size. One type, only is illustrated.

Volatilty Requirements Of Aircraft Fuels

J. H. DOOLITTLE,
Manager Aviation Department, Shell Petroleum Company

One of the major points of difference between an aircraft engine fuel and ordinary motor fuel, is that a higher volatility is required in the former.

The four principal factors which make the aircraft engine dependent to a greater or smaller extent upon the volatility of the fuel are:

1. The ease of starting.
2. Distribution.
3. The freedom from vapor locking troubles.
4. The fire hazard.

Each of the above subjects demands that a certain percentage of the fuel shall or shall not be evaporated under a given set of temperature and pressure conditions. Unfortunately, these conditions vary widely, not only due to the wide variation of atmospheric temperature under which the aircraft engine is operated, but also from one engine to another, according to its design and method of installation. On the other hand, it is fortunate that the small changes in the volatility of gasoline to suit the airplane engine do not appreciably affect its performance in the engine, but that small differences in engine design, especially in the induction system, far outshadow any change that may be made in the volatility of the fuel. We are able therefore to arrive at a satisfactory specification for fuel volatility from a careful study of typical designs of fuel feed systems and manifold construction and a knowledge of the fundamental requirements of these features with respect to the amount of fuel which must be evaporated in these systems at their working temperatures to give satisfactory performance.

The problem resolves itself into two phases: Firstly, a study of the fundamental volatility characteristics of any given fuel—that is to say, how any given fuel will evaporate under any given condition as regards temperature and pressure—and the various means of measuring these fundamental volatility characteristics. Secondly, the question of the practical application of these volatility characteristics and their effect on engine performance, such as easy starting and good distribution.

Let us consider briefly the first phase of our problem: In an aircraft engine fuel is evaporated in the pressure of varying amounts of air at various temperatures and pressures. Obviously, therefore, a fundamental study must be based on the tendency of the fuel to escape into the vapor state at various temperatures under definite conditions, as regards the amount of air present and under equilibrium conditions, or, in other words, the actual basic measurement of the volatility of the fuel is an air equilibrium distillation curve. This curve is not a very easy one to determine, involving as it does, the use of a large amount of complicated apparatus and highly skilled technique. Fortunately, however, for the petroleum industry, Dr. Bridgeman of the Bureau of Standards, has done a considerable amount of work on this subject, and has found that this curve can be computed with a certain degree of accuracy from the ordinary A. S. T. M. distillation curve, between 10 per cent. and 90 per cent. evaporated, and actual measurement of volatility of a fuel is now practically a solved problem.

We have, however, yet to consider the technical application of this volatility and it is in this connection that there is a wide field for discussion. As mentioned above the basic method of measuring the volatility of a fuel, is the equilibrium air distillation curve and we will consider the practical application of volatility from this basis.

In any given engine a definite percentage of the fuel must evaporate under certain given temperature conditions in order to give easy starting and good distribution. On the other hand, the initial fractions of the fuel must not evaporate too easily or we are liable to have vapor locking trouble. That is to say, the flow to and through the carburetor jet will not be large enough to insure a proper working mixture in the manifold of the engine, and also increase the fire hazard in case of a crash.

Consider first the question of starting the engine. In practically every case the engine is "primed" by injecting a small quantity of fuel into the inlet manifold close to the inlet valve so that when the inlet valve opens liquid gasoline is drawn directly into the cylinder. Now in order to be able to get an explosion we must have in the cylinder near the spark plugs, at least one part of fuel vapor to every twenty parts of air. This means that if by means of our priming arrangement, we supply to the cylinder one part of liquid fuel by weight to every three parts of air, then 15 per cent. of our fuel must evaporate under the temperature and pressure conditions existing in the cylinder in order that the engine may start. If, however, our fuel is not sufficiently volatile to evaporate 15 per cent. under these conditions, then in order to get a start we have to supply a greater proportion of fuel to air. We cannot, however, indefinitely continue priming because we will eventually inject so much gasoline that the oil will be washed off the cylinder walls, the compression lost, and further difficulty result. This often happens in very cold weather. Suppose we supply a mixture of equal parts of liquid fuel and air by weight to the cylinder, we need only evaporate 5 per cent. of our fuel. However, suppose our given priming arrangement supplies under starting conditions, a 1 to 1 fuel air mixture and 15 per cent. evaporates at the manifold temperature, the resultant air fuel vapor mixture ratio will be 6 2-3 to 1, which is too rich to give an explosion. This represents over-priming or flooding and is common in a hot motor or in very warm weather. It will be seen, therefore, that the percentage required to be evaporated depends upon the amount of fuel injected. In very cold weather it will be difficult to evaporate 5 per cent. In hot weather 30 per cent. might evaporate and extreme care must be exercised to avoid over-priming. That is to say, the per cent. to be evaporated depends upon the working temperature and pressure conditions in the engine which are dependent almost wholly upon the atmospheric conditions under which the engine is being started, and vary enormously.

Having obtained our initial start, we must consider the problem of obtaining maximum performance as quickly as possible, and it is clear that in order to get this performance and at the same time not run the carburetor at an unnecessarily rich mixture strength, with a consequent crank case dilution, it is necessary for somewhat larger proportion of the gasoline to evaporate. Suppose for instance, we mixed a small quantity of very light material, such as ether or propane-butane mixture with a considerable quantity of heavy material, or in other words, use a fuel with a steeply rising distillation curve. It would then be easy to make a small

(Continued on Page 11)

MAJOR SPECIFICATIONS AND MECHANICAL DETAILS OF

Make and Model	Capacity—Tons	Chassis Price	Engine	No. of Cyl.	Bore and Stroke	Tax H. P.	Oil System	Carburetor	Fuel Feed	Ignit. System	Gear Set	Location	No. Spds. For.	Rear Axle	Final Drive	Reduction in Low	Brakes, Foot	Brakes, Hand	Standard Wheel Base	Chassis Weight	Standard Tire Sizes Rear	Front
Am. La France Chief	2	3650	Own	6	3¾x5	33.0	Pw	Str	Vac	DR	Own	C	4	Tim	Wo	31.2	4	D	156	6200	32x6	32x6D
Am. La France W	3-4	3950	Own 2 R	4	4¼x6	28.9	CS	Zen	Vac	AB	Own	C	4	Own	2R	47.4	4	R	160	7200	S36x5	S36x5D
Am. La Fran. Chieftain	3-4	5500	Own	6	4⅛x5⅛	40.8	Pw	Zen	Vac	DR	Own	C	4	Tim	Wo	28.8	4	D	175	7200	S36x8	36x8D
Am. La France V	5	5500	Own 5 R	4	4¾x6	36.2	CS	Zen	Vac	AB	Own	C	4	Own	Wo	54.4	4	R	165	9800	S36x5	S40x6D
Am. La Fran. Big Chief	6	6725	Own	6	4½x6	48.6	Pw	Zen	Vac	DR	Own	C	4	Own	2R	32.8	4W	D	226	10600	S40x8	S40x8D
Am. La France Z	6½	5750	Own 5 R	4	4¾x6	36.2	CS	Zen	Vac	AB	Own	C	4	Own	Wo	63.5	4	R	165	10000	S36x7	S40x7D
Am. La France U	7½	6000	Own 5 R	4	4¾x6	36.2	CS	Zen	Vac	AB	Own	C	4	Own	—	63.5	4	R	165	10500	S36x7	S40x8D
Austin	—	*499	Own	4	2.2x3	7.8	—	Til	—	Aut-L	W-G	U	3	Sal	Sp	—	4	4	75	——	3.75x18	3.75x18
Autocar A	1½-2	3200	Own	6	4 x4¾	38.4	Pw	Str	Vac	DR	Br-L 51	U	4	Own SA	Sp	27.9	4	R	150	5060	34x7	34x7
Autocar D	2-2½	3500	Own	6	4 x4¾	38.4	Pw	Str	Vac	DR	Br-L 51	U	4	Own SD	2R	33.7	4	R	150	5300	34x7	34x7D
*Autocar SH	2½-3	4300	Own	6	4¼x4¾	43.4	Pw	Str	Gra	LN	Own T	U	4	Own H	2R	44.3	R	R	114	6770	34x7	34x7D
Autocar SCH	2½-3	4300	Own	6	4¼x4¾	43.4	Pw	Str	Vac	LN	Own T	U	4	Own H	2R	44.3	R	D	157	6860	34x7	34x7D
*Autocar H	3	4100	Own	4	4½x5½	32.4	CS	Str	Gra	AB	Own T	U	4	Own H	2R	48.6	R	R	114	6770	34x7	34x7D
*Autocar HS	3½	4600	Own	4	4½x5½	32.4	CS	Str	Gra	AB	Own T	U	4	Own C	2R	53.6	R	R	114	7900	40x8	40x8D
*Autocar SHS	3-3½	4800	Own	6	4¼x4¾	43.4	Pw	Str	Gra	LN	Own T	U	4	Own C	2R	53.6	R	R	114	7900	40x8	40x8D
*Autocar SCHS	3-3½	4800	Own	6	4¼x4¾	43.4	Pw	Str	Vac	LN	Own T	U	4	Own C	2R	53.6	R	D	157	8180	40x8	40x8D
Autocar TEA	3-3½	5350	Own	6	4¼x4¾	43.4	Pw	Str	Vac	LN	Own T	U	12	Own TE	2R	101.7	4	D	192	8900	36x8	36x8D
Autocar TFA	3½-5	6100	Own	6	4½x4¾	48.6	Pw	Str	Vac	LN	Own T	U	12	Own TF	2R	101.3	4	D	192	9300	38x9	38x9D
Autocar C	3½-5	5500	Own	6	4½x4¾	48.6	Pw	Str	Vac	LN	Own B	C	4	Own C	2R	61.7	R	D	172	9500	42x9	42x9D
Autocar F	7½	6800	Own	6	4½x4¾	48.6	Pw	Str	Vac	LN	Br-L 70	C	7	Tim	Wo	94.0	4	D	173	11000	36x7S	40x8DS
Autocar G	10	9000	Own	6	4½x4¾	48.6	Pw	Str	Vac	LN	Br-L 70	C	7	Tim	Wo	97.7	WB	D	171	13000	36x8	36x8D
Brockway 65	1	1195	Con	6	3⅜x4⅝	27.3	Pw	Zen	Vac	Aut	Br-L	U	3	Col	Sp	21.3	4	Tr	137	3400	30x5	30x5
Brockway 75	¼	1290	Con	6	3⅜x4⅝	27.3	Pw	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.6	4	Tr	137	3450	32x6	32x6
Brockway 90	1½	1525	Con	6	3⅜x4⅝	27.3	Pw	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.6	4	Tr	149	3650	32x6	32x6
Brockway 120	2	1990	Con	6	4 x4⅛	38.4	Pb	Zen	P	Aut	Br-L	U	4	Tim	Sp	—	4	Tr	156	5200	32x6	32x6D
Brockway 140	2	2495	Con	6	4 x4⅛	38.4	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	156	5500	32x6	32x6D
Brockway 170	2½	3160	Con	6	4⅛x4¾	40.8	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	170	6800	32x6	32x6D
Brockway 195	3	3820	Con	6	4⅛x4¾	40.8	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	170	7500	34x7	34x7D
Brockway 190	3	4185	Con	6	4⅛x4¾	40.8	Pb	Str	P	Aut	Br-L	C	7	Tim	Wo	—	RV	D	168½	7625	34x7	34x7D
Brockway 220	3½	4560	Con	6	4⅜x4¾	45.9	Pb	Zen	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	170	8200	36x8	36x8D
Brockway 250	5	5950	Con	6	4⅜x4¾	45.9	Pb	Str	P	Aut	Br-L	U	4	Tim	Wo	—	4HV	D	182	10000	40x8	40x8D
Brockway 290	7½	7250	Con	6	4¾x5¾	54.15	Pw	Str	P	L-N	Br-L	C	7	Tim	Wo	—	4W	D	182	10750	38x7	40x14S
Brockway 640	10	9700	Con	6	4¾x5¾	54.15	Pw	Str	P	L-N	Br-L	C	7	Tim	Wo	—	4W	R	212	14000	38x7	36x10S
Chevrolet	½	365	Own	6	3⅛x3¾	26.3	CS	Car	P	DR	Own	U	3	Own	Sp	13.61	4	R	107	1835	4.75x19	4.75x19
Chevrolet	1½	520	Own	6	3⅛x3¾	26.3	CS	Car	P	DR	Own	U	4	Own	Sp	33.46	4	R	131	2375	30x5	30x5
Commerce Series S 11	1	1600	Bud H S 6	6	3⅜x4½	27.3	Pb	Zen	Vac	Aut	Br-L 20	U	4	Col 54028	Sp	25.5	4	D	142	3900	30x5P	30x5P
Commerce Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L 35	U	4	Tim 63702	Wo	34.8	4		168	4700	34x5P	34x5D
Commerce Series S 11	2	2030	Bud H S 6	6	3⅜x4½	27.3	Pb	Zen	Vac	Aut	Br-L 20	U	4	Tim 54006	Sp	29.2	4		162	4500	32x6P	32x6D
Commerce Series 40	2	3240	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L 35	U	4	Tim 63702	Wo	34.8	4		168	4900	36x6	36x6D
Commerce Series 40	2½	3240	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L 35	U	4	Tim 63702	Wo	34.8	4		168	5100	36x6P	36x6D
Commerce Series 60	2½	4580	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Ful	U	5	Tim 65706DH	Wo	63.0	4		175	7000	36x6P	36x6D
Commerce Series 60	3	4680	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Ful	U	5	Tim 65706DH	Wo	63.0	4		175	7100	36x6P	36x6D
Commerce Series 80	3½	5250	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim 66700DP	Wo	98.2	B		175	8200	36x6S	36x12S
Commerce Series 100	5	5830	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim 68700DP	Wo	95.0	B		175	9600	36x6S	40x14S
Day Elder 60	1	1195	Con 25 A	6	3⅜x4	27.3	Pw	Zen	P	DR	W-G	U	4	Tim	Sp	36.3	4	D	135	3200	20x6.50B	20x6.50B
Day Elder 85	1½	1645	Con 16 C	6	3⅜x4⅝	27.3	Pw	Zen	P	DR	W-G	U	4	Tim	Sp	42.3	4	D	135	3750	20x6B	20x6.50DB
Day Elder 110	2	2095	Con 16 C	6	3⅜x4⅝	27.3	Pw	Zen	P	DR	Br-L	U	4	Tim	Sp	36.4	4	D	156	4200	20x7B	20x7DB
Day Elder 130	2½	2895	Con 16 R	6	4 x4⅛	33.4	Pw	Zen	P	DR	Br-L	U	4	Tim	Sp	33.0	4	D	150	5300	20x7.50B	20x7.50DB
Day Elder 160	3	3695	Con 18 R	6	4 x4½	33.4	Pw	Zen	P	DR	Br-L	U	4	Tim	Wo	36.1	4	D	156	6900	20x7.50B	20x9DB
Day Elder 200	4	4295	Con 18 R	6	4 x4½	33.4	Pw	Zen	P	DR	Br-L	U	4	Tim	Wo	43.5	4	D	156	7500	20x9B	20x9DB
Day Elder 240	5	5500	Con 21 R	6	4⅜x4¾	45.9	Pw	Zen	V	DR	Br-L	C	4	Tim	Wo	50.8	4	D	162	9200	38x9P	38x9DP
Day Elder 285	8	6000	Con 21 R	6	4⅜x4¾	45.9	Pw	Zen	V	DR	Br-L	C	7	Tim	Wo	71.2	6	D	164	10000	20x8.25B	20x8.25DB
Day Elder 345	10	7500	Con 21 R	6	4⅜x4¾	45.9	Pw	Zen	V	DR	Br-L	C	7	Tim	Wo	79.9	4	D	164	11700	20x9B	20x9DB
Day Elder 402	12	8500	Con 16 H	6	4⅜x5¾	54.2	Pw	Zen	P	DR	Br-L	C	7	Tim	Wo	84.6	4	D	164	12300	20x9.75B	20x9.75Db
Diamond T 200	1	785	Bud	4	3¾x4½	22.5	Pw	Zen	P	Aut	W-G	U	4	Cla	Sp	—	4	D	128½	3050	30x5	30x5
Diamond T 215	1	885	Bud	6	3⅜x4	27.3	Pw	Zen	P	Aut	W-G	U	4	Cla	Sp	—	4	D	135¼	3150	30x5	30x5
Diamond T 290	1½	1475	Her WXA 2	6	3½x4½	29.4	Pb	Zen	Vac	Aut	Cov	U	4	Col	Sp	—	4	D	156¼	4160	30x5	30x5D
Diamond T 303	2	1745	Her WXB	6	3¾x4½	33.7	Pb	Zen	Vac	Aut	Cov	U	4	Tim	Sp	—	4	D	160¾	4850	32x6	32x6D
Diamond T 551	2½	2250	Her WXC	6	4 x4½	38.4	Pb	Zen	Vac	Aut	Cov	U	4	Tim	Sp	—	4	D	168	5600	32x6	32x6D
Diamond T 503	2½	2660	Her WXC	6	4 x4½	38.4	Pb	Zen	Vac	Aut	Cov	U	4	Tim	Wo	—	4	D	174	6200	34x7	34x7D
Diamond T 506	2½	2820	Her WXC	6	4 x4½	38.4	Pb	Zen	Vac	Aut	Cov	U	4	Wis	2R	—	4	D	172½	6300	34x7	34x7D
Diamond T 602	3	3440	Her YXC	6	4⅜x4¾	45.9	Pb	Zen	Gra	Aut	Cov	C	4	Tim	Wo	—	4	D	169½	7500	36x8	36x8D
Diamond T 606	3	3500	Her YXC	6	4⅜x4¾	45.9	Pb	Zen	Gra	Aut	Cov	U	4	Wis	2R	—	4	D	186	7500	36x8	36x8D
Diamond T 700	3½	3740	Her YXC	6	4⅜x4¾	45.9	Pb	Zen	Gra	Aut	Cov	C	4	Tim	Wo	—	R	D	162	8100	S36x5	S36x10
Diamond T 801	4	4140	Her YXC	6	4⅜x4¾	45.9	Pb	Zen	Gra	Aut	Br-L	C	7	Own	Wo	—	6WH	D	189½	8300	36x8 4 wh	36x8
Diamond T 1000	5	4420	Her YXC 2	6	4½x4¾	48.6	Pb	Zen	Gra	Aut	Br-L	C	4	Tim	Wo	—	R	D	170½	9700	S36x6	S40x12
Diamond T 1200	6	5600	Her YXC 2	6	4½x4¾	48.6	Pb	Zen	Gra	Aut	Br-L	C	7	Tim	Wo	—	4RW	D	180	11000	34x7 4 w h	34x7D
Diamond T 1600	8	6220	Her YXC 3	6	4⅝x4¾	51.3	Pb	Zen	Gra	Aut	Br-L	C	7	Tim	Wo	—	4RW	D	190	11700	36x8 4 wh	36x8D
Diamond T 1601	8	7500	Wak 6 R B	6	5 x5¾	60.0	Pb	Zen	Gra	Mag	Br-L	C	7	Tim	Wo	—	4RW	D	194	12500	36x8 4 wh	36x8D
Diamond T 2590	10-12	8000	Wak 6 R B	6	5 x5¾	60	Pb	Zen	Gra	Mag	Br-L	C	7	Tim	Wo	—	4RW	D	194	13100	S36x7 4 wh	36x12S
Dodge Bros. UF10A	½	435	Own	4	3⅝x4¾	21.2	—	—	—	—	Own	U		Own	—	—	—	—	109	1855	5.00x19	5.00x19
Dodge Bros. F 10 A	½	515	Own	6	3⅛x4⅛	23.4	—	—	—	—	Own	U		Own	—	—	—	—	109	1960	5.25x19	5.25x19
Dodge Bros. U-1	¾	695	Own	4	3⅝x4¼	21.3	Pb	Car	Vac	NE	Own	U	3	Own	Sp	21.68	4	D	124	2260	5.50x20B	5.50x20B
Dodge Bros DA1	¾	795	Own	6	3⅜x3⅞	27.3	Pb	Zen	Vac	NE	Own	U	3	Own	Sp	19.21	4	D	124	2360	5.50x20B	5.50x20B
Dodge Bros. U-1	1	795	Own	4	3⅝x4¼	21.3	Pb	Car	Vac	NE	Own	U	4	Own	Sp	36.13	4	D	133	2590	6.00x20B	32x6
Dodge Bros. DA1	1	895	Own	6	3⅜x3⅞	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	33.45	4	D	133	2690	6.00x20B	32x6
Dodge Bros DA1	1	1095	Own	6	3⅜x3⅞	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	36.83	4	D	140	2955	30x5	30x5
Dodge Bros. UF30A	1½	595	Own	4	3⅝x4¾	21.0	—	—	—	—	Own	U		Own	—	—	—	—	136	2665	6.00x20	32x6
Dodge Bros. F 30 A	1½	695	Own	6	3⅛x4⅛	23.4	—	—	—	—	Own	U		Own	—	—	—	—	136	2765	6.00x20	32x6
Dodge Bros DA1	1½	1365	Own	6	3⅜x3⅞	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	36.83	4	D	150	3695	32x6	32x6
Dodge Bros. F 35 A	1½	1425	Own	6	3⅜x3⅞	27.3	—	—	—	—	Own	U		Own	—	—	—	—	140	3780	6.00x20	6.00x20D
Dodge Bros. DA1	1½	1415	Own	6	3⅜x3⅞	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	36.83	4	D	165	3810	32x6	32x6
Dodge Bros. DB1	2	1595	Own	6	3⅜x4½	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	36.83	4	D	150	3930	32x6	34x7
Dodge Bros DB1	2	1645	Own	6	3⅜x4½	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	36.83	4	D	165	4070	32x6	34x7
Dodge Bros. F 40 A	2	1995	Own	6	3⅝x5	31.5	—	—	—	—	Own	U		Own	—	—	—	—	150	5175	6.50x20	6.50x20D
Dodge Bros. DB1	3	1845	Own	6	3⅜x4½	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	46.31	4	D	135	4235	32x6	32x6D
Dodge Bros. DB1	3	1895	Own	6	3⅜x4½	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	41.43	4	D	165	4520	32x6	32x6D
Dodge Bros. DB1	3	1945	Own	6	3⅜x4½	27.3	Pb	Zen	Vac	NE	Own	U	4	Own	Sp	46.31	4	D	185	4715	32x6	32x6D
Dodge Bros. F 60 A	3	2645	Own	6	3⅝x5	31.5	—	—	—	—	Own	U		Own	—	—	—	—	146	5543	32x6	32x6D
Dodge Bros. F 61 A	3	2575	Own	6	3⅝x5	31.5	—	—	—	—	Own	U		Own	—	—	—	—	170	5789	32x6	32x6D
Durant	¾	495	Con	4	3⅜x4¼	18.2	Pb	Til	Vac	Aut	Own	C	3	Own	Sp	16.16	4	4	107	1670	28x4.75	28x4.75
Essex Commercial	¾	445	Own	6	2¾x4½	18.2	CS	Mar	Vac	Aut	Own	U	3	Own	Sp	17.8	4	4	110	2150	30x5	31x5.50
Fargo Packet	½	545	Own	6	3 x4⅛	21.6	Pb	Str	Vac	NE	Own	U	3	Own	Sp	14.29	4	Tr	——	1835	5.00x19	5.00x19
Fargo Clipper	¾	725	Own	6	3⅛x4¼	23.4	Pb	Str	Vac	DR	Own	U	3	Own	Sp	15.53	4	Tr	——	2325	5.50x18	5.50x18
Fargo Freighter	1	795	Own	6	3 x4⅛	21.6	Pb	Str	Vac	NE	Own	U	4	Own	Sp	37.19	4	Tr	——	2785	6.00x20	32x6
Federal E6	1½	1090	Con 17 E	6	3⅜x4	27.3	Pb	Zen	Vac	DR	W-G T9	U	4	Cla B370	Sp	34.6	4	Tr	132	3260	6.00x20	32x6
Federal D	1-1½	830	Con W 10	4	3⅞x4¼	24.0	Pb	Zen	P	DR	W-G T9	U	4	Cla B372	Sp	40.8	4	Tr	131	3185	6.00x20	32x6
Federal F7	1½	1525	Con 16 C	6	3⅜x4⅝	27.3	Pb	Zen	P	DR	Own	U	4	Tim 52005H	Sp	24.3	4	Tr	132	3765	30x5	30x5D
Federal A6	2	1855	Con 16 C	6	3⅜x4⅝	27.3	Pb	Zen	Vac	DR	Own	C	4	Cla B610	Sp	38.5	4	Tr	151	4580	32x6	32x6D
Federal A6T	2½	2185	Con 16 C	6	3⅜x4⅝	27.3	Pb	Zen	Vac	DR	Own	C	4	Tim 58000H	Sp	41.3	4	Tr	151	4950	32x6	32x6D
Federal A6TW	2½	2360	Con 16 C	6	3⅜x4⅝	27.3	Pb	Zen	Vac	DR	Own	C	4	Tim 65001H	Wo	42.0	4	Tr	151	4950	32x6	32x6D
Federal T10B	2½-3	2740	Con 16 R	6	4 x4⅛	38.4	Pb	Zen	P	DR	Own	C	4	Tim 58000H	Sp	36.3	4	Tr	165	6550	34x7	34x7D
Federal T10W	2½-3	2915	Con 16 R	6	4 x4⅛	38.4	Pb	Zen	P	DR	Own	C	4	Tim 65001H	Wo	44.0	4	Tr	165	6550	34x7	34x7D
Federal U6	3-3½	3860	Con 18 R	6	4 x4½	38.4	Pb	Str	P	DR	Br-L 55	C	7	Tim 65706HP	Wo	64.6	4	D	165	7220	34x7	34x7D
Federal 4C6A	4-5	4735	Con 20 R	6	4⅛x4¾	40.8	Pb	Zen	P	DR	Br-L 55	C	7	Tim 66704HP	Wo	73.6	4	D	192	8330	36x8	36x8D
Federal 4C6AB	4-5	4960	Con 20 R	6	4⅛x4¾	40.8	Pb	Zen	P	DR	Br-L 55	C	7	Tim 66704TWP	Wo	73.6	4	D	192	8850	36x8	36x8D
*Federal U6SW	6	6000	Con 20 R	6	4⅛x4¾	40.8	Pb	Zen	P	DR	Br-L 55	C	7	Tim SW 200	Wo	71.3	6	Tr	201	9850	34x7	34x7D
*Federal U6SWAB	6	6500	Con 20 R	6	4⅛x4¾	40.8	Pb	Zen	P	DR	Br-L 55	C	7	Tim SW 200	Wo	71.3	4	Tr	201	9900	34x7	34x7D
Federal X8	7½	5085	Con B 7	4	5 x6	40	Pw	Zen	Vac	AB	Br-L 60	C	7	Tim 68700DP	Wo	110.9	R	D	162	9750	36x6S	40x14S
Federal X8R	7½	5810	Con 21 R	6	4⅜x4¾	45.9	Pb	Zen	P	DR	Br-L 60	C	7	Tim 68700DP	Wo	110.9	R	D	162	10000	40x8	40x8D
*Federal 4C6SW	8	7500	Con 21 R	6	4⅜x4¾	45.9	Pb	Zen	P	DR	Br-L 55	C	7	Tim SW 300	Wo	80.8	4	Tr	231	11500	36x8	36x8D

1930 COMMERCIAL CARS BUILT IN THE UNITED STATES

Make and Model	Capacity—Tons	Chassis Price	Engine	No. of Cyl.	Bore Stroke	Tax H. P.	Oil System	Carburetor	Fuel Feed	Ignit. System	Gear Set	Location	No. Spds. For.	Rear Axle	Final Drive	Reduction in Low	Brakes, Foot	Brakes, Hand	Standard Wheel Base	Chassis Weight	Standard Tire Sizes Front	Rear
Ford AA	1½	520	Own	4	3⅞x4¼	24.0	Sp	Zen	Gra	Own	Own	U	4	Own	St	42.24	4	R	131½	2792	6.00x20	32x6
Ford AA	1½	545	Own	4	3⅞x4¼	24.0	Sp	Zen	Gra	Own	Own	U	4	Own	St	42.24	4	R	157	2570	6.00x30	6.00x30D
F. W. D.—H	1½	3300	Wis S U	4	4 x5	25.6	Pb	Zen	Vac	Eis	Cotta	C	4	Own	St	38.1	4	R	121	5300	34x7	34x7
F. W. D.—H6	2	3425	Wak	6	3½x4½	29.4	Pb	Zen	Vac	Eis	Br-L	U	4	Own	St	35.0	4	R	133	5500	34x7	34x7
F. W. D.—BTL4	2	3900	Wis S U	4	4 x5	25.6	Pb	Zen	Vac	Eis	Br-L	C	7	Own	St	84.7	4	R	120	6000	36x8	36x8
F. W. D.—HH6	2½	4000	Wak	6	3¾x4½	33.7	Pb	Zen	Vac	Eis	Br-L	C	7	Own	St	101.0	4	R	133	5700	36x8	36x8
F. W. D.—B	3	4200	Own	4	4¾x5½	36.1	Pb	Str	Gra	Eis	Own	C	3	Own	St	35.6	4	R	124	6460	36x6S	36x6S
F. W. D.—B 5	3	4525	Own	4	4¾x5½	36.1	Pb	Str	Gra	Eis	Own	C	5	Own	St	88.6	4	R	132	6800	36x6S	36x6S
F. W. D.—B T	3	4742	Own	4	4¾x5½	36.1	Pb	Str	Vac	Eis	Own	C	5	Own	St	101.0	4	R	133¾	7700	40x7S	40x5SD
F. W. D.—U 4	3	4575	Own	4	4¾x5½	36.1	Pb	Str	Vac	Eis	Own	C	5	Own	St	88.6	4	R	148	7000	36x6S	36x6S
F. W. D.—C U 6	3½	5120	Wak	6	4 x4¾	38.6	Pb	Zen	Vac	Eis	Own	C	5	Own	St	88.6	4	R	148	7200	36x6S	36x8S
*F. W. D.—X 6	6	6500	Wak	6	4¼x4¾	43.3	Pb	Zen	Vac	Eis	Own	C	5	Own	St	88.6	*	4	170	9500	36x8	36x8
Garford Series S 11	1	1600	Bud H S 6	6	3⅜x4½	27.3	Pb	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.5	4	D	142	3900	30x5	30x5
Garford Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4700	34x5	D34x5
Garford Series 40	2	3240	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4900	36x6	D36x6
Garford Series 60	2½	4580	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Ful	U	5	Tim	Wo	63.0	4	D	175	7000	36x6	D36x6
Garford Series 80	3½	5250	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	98.2	4	D	175	8200	S36x6	S36x12
Garford Series 100	5	5830	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	95.0	4	D	175	9600	S36x6	S40x14
Gen. Mot. T11-1001	*3800	625	Pontiac	6	3⅛x3⅞	26.3	Pb	Mar	P	DR	Own	U	3	Pontiac	Sp	14.7	4	4	109⅝	1980	5.00x19B	5.50x19B
Gen. Mot. T15-1501	*5400	695	Pontiac	6	3⅛x3⅞	26.3	Pb	Mar	P	DR	Own	U	3	Tim 51500	Sp	16.14	4	4	130	2625	5.50x20B	5.50x20B
Gen. Mot. T17-1701	*5500	735	Pontiac	6	3⅛x3⅞	26.3	Pb	Mar	P	DR	Own	U	3	Tim 51505	Sp	16.04	4	4	130	2650	6.50x20B	6.50x20B
Gen. Mot. T19-2201	*6300	895	Pontiac	6	3⅛x3⅞	26.3	Pb	Mar	P	DR	Mun	U	4	Tim 5261	Sp	34.45	4	D	130	2850	5.50x20B	32x6
Gen. Mot. T17-1707	*6500	750	Pontiac	6	3⅛x3⅞	26.3	Pb	Mar	P	DR	Own	U	3	Tim 51505	Sp	16.04	4	4	130	2670	5.50x20B	32x6
Gen. Mot. T25-2501	*6800	1235	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Tim 5261	Sp	29.62	4	D	130	3375	6.00x20B	7.50x20B
Gen. Mot. T19-2214	*8500	985	Pontiac	6	3⅛x3⅞	26.3	Pb	Mar	P	DR	Mun	U	4	Tim 5261	Sp	34.45	4	D	130	2925	30x5	30x5D
Gen. Mot. T25-2509	*8500	1280	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Tim 5261	Sp	29.62	4	D	130	3425	30x5	30x5D
Gen. Mot. T30-3206	*9000	1555	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Eat 1617	Sp	28.6	4	D	141	4450	6.00x20B	8.25x20B
Gen. Mot. T42-4206	*10600	1735	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Eat 1717	Sp	33.38	4	D	141	4575	7.00x20B	9.00x20B
Gen. Mot. T30-3203	*11000	1605	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Eat 1617	Sp	28.6	4	D	141	4525	32x6	32x6D
Gen. Mot. T44-4401	*12000	1965	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Eat T44DR	2R	40.89	4	D	141	4825	32x6	32x6D
Gen. Mot. T42-4203	*14000	1960	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Eat 1717	Sp	33.38	4	D	141	4905	36x6	36x6D
Gen. Mot. T44-4404	*15000	2095	Buick	6	3⅞x4⅝	28.3	Pb	Mar	P	DR	Mun	U	4	Eat T44DR	2R	40.89	4	D	141	5095	34x7	34x7D
Gen. Mot. T60-6202	*16500	3035	Buick	6	3¾x5	33.7	Pb	Mar	P	DR	Mun	U	4	Tim 65706	Wo	52.53	4	D	154¼	6925	34x7	34x7D
Gen. Mot. T60-6205	*18500	3125	Buick	6	3¾x5	33.7	Pb	Mar	P	DR	Mun	U	4	Tim 65706	Wo	52.53	4	D	154¼	6925	9.00x20B	9.00x20DB
Gen. Mot. T82-8202	*19000	3795	Buick	6	3¾x5	33.7	Pb	Mar	P	DR	Br-L	C	5	Tim 66704	Wo	82.2	4	D	155	7500	9.00x20B	9.00x20DB
Gen. Mot. T82-8207	*22000	4070	Buick	6	3¾x5	33.7	Pb	Mar	P	DR	Br-L	C	5	Tim 66704	Wo	82.2	4	D	155	7850	38x7	38x9D
Gen. Mot. T90-9001	*23000	5885	Buick	6	3¾x5	33.7	Pb	Mar	P	DR	Br-L	C	5	Tim SW-200	Wo	76.04	WR	D	185¼	9400	7.50x20B	7.50x20D
Gen. Mot. T90-9004	*28000	6055	Buick	6	3¾x5	33.7	Pb	Mar	P	DR	Br-L	C	5	Tim SW-200	Wo	76.04	WR	D	185¼	9775	8.25x20B	8.25x20DB
*Gramm B	1½	1495	Lyc 4 SL	6	3¼x4½	25.3	Pb	Zen	Vac	Aut	Cov	U	4	Tim	Sp	34.3	4	Tr	140	3800	30x5	30x5D
*Gramm C	2	1795	Lyc ASA	6	3⅝x4½	31.54	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	31	4	Tr	160	4820	32x6	32x6D
*Gramm D	2½	2195	Lyc TS	6	3⅞x5	36	Pb	Zen	P	Aut	Cov	U	4	Tim	Sp	33	4	Tr	160	5100	32x6	32x6D
*Gramm E	3	2595	Lyc TS	6	3⅞x5	36	Pb	Zen	P	Aut	Ful	U	4	Tim	Sp	35	4	Tr	160	5300	34x7	34x7D
*Gramm EY	3	3595	Con 20 R	6	4¼x4¾	40.80	Pb	Zen	P	Aut	Ful	U	4	Tim	Sp	30	4	D	190	6750	32x6	32x6D
*Gramm T-38	3	3595	Lyc TS	6	3⅞x5	36	Pb	Zen	P	Aut	Ful	U	4	Wis	2R	45	D	R	153	7200	36x5S	36x10S
*Gramm O-45	4	3995	Lyc TS	6	3⅞x5	36	Pb	Zen	P	Aut	Ful	C	8	Wis	2R	75.8	D	R	153	7700	36x5S	36x12S
*Gramm GY	4	4345	Con 21 R	6	4⅜x4¾	45.9	Pb	Zen	P	Aut	Ful	U	4	Wis	2R	28	4	D	210	7200	34x7	34x7D
*Gramm O-60	5	4745	Lyc TS	6	3⅞x5	36	Pb	Zen	P	Aut	Ful	C	8	Wis	2R	78.4	D	R	153	8800	36x6S	36x14S
*Gramm HY	5	6545	Con 16 H	6	4¾x5¾	54.15	Pb	Zen	P	Aut	Ful	U	4	Wis	2R	25.2	4	D	236	9600	36x8	36x8D
Indiana 64	1	1195	Con	6	3⅜x4⅝	27.3	Pb	Str	Vac	Aut	Br-L	U	3	Col	Sp	21.3	4	Tr	137	3435	30x5	30x5
Indiana 74	1¼	1290	Con	6	3⅜x4⅝	27.3	Pb	Str	Vac	Aut	Br-L	U	4	Col	Sp	25.6	4	Tr	137	3450	32x6	32x6
Indiana 11	1¼	1425	Her	4	4 x5	25.6	Pb	Str	Gra	Aut	Br-L	U	3	Cla	Sp	24.48	R	R	129½	3500	30x5	30x5
Indiana 89	1½	1525	Con	6	3⅜x4⅝	27.3	Pb	Str	Vac	Aut	Br-L	U	4	Col	Sp	25.6	4	Tr	149	3650	32x6	32x6
Indiana 111	1½	1630	Her	4	4 x5	25.6	Pb	Str	Gra	Aut	Br-L	U	3	Cla	Sp	26.4	R	R	129½	3600	30x5	32x6
Indiana 111 XW	2	1850	Her	4	4 x5	25.6	Pb	Str	Vac	Eis	Br-L	U	4	Wis	2R	30.14	R	Tr	120	3740	32x6	32x6D
Indiana 120	2	1990	Con	6	4 x4⅛	38.4	Pb	Str	P	Aut	Br-L	U	4	Tim	Sp	—	4	Tr	156	5200	32x6	32x6D
Indiana 140	2	2495	Con	6	4 x4⅛	38.4	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	—	4V	Tr	156	5500	32x6	32x6D
Indiana 115 A	2½	2740	Her	4	4¼x5	28.9	Pb	Str	Vac	Eis	Br-L	U	4	Cla	Sp	42.99	R	Tr	132	4970	32x6	34x7D
Indiana 615 A	2½	3070	Wis	6	3⅜x5	27.34	Pb	Str	Vac	Eis	Br-L	U	4	Cla	Sp	46.29	R	Tr	136	5160	32x6	32x6D
Indiana 170	2½	3160	Con	6	4⅛x4¾	40.8	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	170	6800	32x6	32x6D
Indiana 127 AW	3	3775	Her	4	4¼x5	28.90	Pb	Str	Vac	Eis	Br-L	U	5	Wis	2R	41.72	RV	D	158¼	7000	34x7	34x7D
Indiana 627 AW	3	4075	Wis	6	4 x5	38.40	Pb	Str	Vac	Eis	Br-L	U	5	Wis	2R	41.72	RV	D	156¼	7200	34x7	34x7D
Indiana 195	3	3820	Con	6	4⅛x4¾	40.8	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	170	7500	34x7	34x7D
Indiana 190	3	4185	Con	6	4⅛x4¾	40.8	Pb	Str	P	Aut	Br-L	C	7	Tim	Wo	—	RV	D	168½	7625	34x7	34x7D
Indiana 220	3½	4560	Con	6	4⅜x4¾	45.9	Pb	Str	P	Aut	Br-L	U	4	Wis	2R	—	4HV	D	170	8200	36x8	36x8D
Indiana 250	5	5950	Con	6	4⅜x4¾	45.9	Pb	Str	P	Aut	Br-L	U	4	Tim	Wo	—	4HMV	D	182	10000	40x8	40x8D
Indiana 290	7	7250	Con	6	4¾x5¾	54.15	Pb	Str	P	L-N	Br-L	C	7	Tim	Wo	—	4W	D	182	10750	38x7	40x14S
Indiana 640	10	9700	Con	6	4¾x5¾	54.15	Pb	Str	P	L-N	Br-L	C	7	Tim	Wo	—	4RW	D	212	14000	38x7	36x10S
International AW-1	¾	720	Wak X A	4	3½x4½	19.6	Pb	Zen	Vac	DR	Mec	U	3	Eat 517	Sp	17.4	4	2	136	2620	5.25x20	5.25x20
Int. Harvester Sp. Del.	¾	720	Wak X A	4	3½x4½	19.6	Pb	Zen	Vac	DR	Mec	U	3	Eat 502 R	Sp	15.1	4	2	124	2200	30x5.25	30x5.25
Int. Harv. 6 Spd. Spec.	1	820	Wak X A	4	3½x4½	19.6	Pb	Zen	Vac	DR	Mec	U	3	Eat 1124	Sp	52.6	4	2	124	2430	30x5	30x5
Int. Harvester S-24	1¼	1160	Lyc C T	4	3¾x5	22.5	Pw	Zen	Vac	DR	Own	U	3	Eat 1002	Sp	21.3	4	2	130	3200	30x5	30x5
Int. Harvester S-26	1¼	1310	Lyc 4 S L	6	3¼x4½	25.3	Pb	Zen	Vac	DR	Own	U	3	Eat 1002	Sp	21.3	4	2	130	3250	30x5	30x5
Int. Harvester SF-34	1½	1450	Lyc C T	4	3¾x5	22.5	Pw	Zen	Vac	DR	Own	U	3	Eat 1502	Sp	22.6	4	2	140	3520	30x5	32x6
International AL-3	1½	1450	Lyc SLH	6	3¼x4½	25.3	Pb	Zen	Vac	DR	W-G	U	4	Eat 1518	Sp	42.9	4	2	138	4300	6.00x20	6.00x20D
Int. Harvester SF-36	1½	1600	Lyc 4 S L	6	3¼x4½	25.3	Pb	Zen	Vac	DR	Own	U	3	Eat 1502	Sp	22.6	4	2	140	3570	30x5	32x6
Int. Harvester SD-44	2	1590	Lyc C T	4	3¾x5	22.5	Pw	Zen	Vac	AB	Own	U	4	Eat 2002	Sp	40.6	4	2	117	3700	30x5	32x6
Int. Harvester SD-46	2	1740	Lyc 4 S L	6	3¼x4½	25.3	Pb	Zen	Vac	AB	Own	U	4	Eat 2002	Sp	40.6	4	2	117	3750	30x5	32x6
Int. Harvester SF-46	2	1950	Lyc 4 S L	6	3¼x4½	25.3	Pb	Zen	Vac	DR	Own	U	4	Eat 2002	Sp	40.6	4	2	140	4000	32x6	32x6D
Int. Harvester A-4	2	1985	Own-FBB	6	3⅝x4½	31.5	Pb	Zen	Vac	DR	Own	U	5	Eat 1712	Sp	47.8	4	2	145	5070	32x6	32x6D
Int. Harvester HS-54	2½	3850	Hall-S 151	4	4¼x5½	28.9	Pb	Zen	Vac	RB	Own	U	5	Eat 54	2R	60.5	4	4	148	8000	36x5S	36x8S
Int. Harvester HS-54-C	2½	3850	Hall-S 151	4	4¼x5½	28.9	Pb	Zen	Vac	RB	Own	U	5	Own A M 428	Ch	63.8	4	4	148	8665	36x5S	36x10S
Int. Harvester W-1	2½	3850	Hall-S 151	4	4¼x5½	28.9	Pb	Zen	Vac	RB	Own	U	5	Eat 58	2R	60.5	4	2	148	8300	36x5S	36x8S
Int. Harvester A-5	3	2550	Own-FBB	6	3⅝x4½	31.5	Pb	Zen	Vac	DR	Own	U	5	Eat 2112	Sp	52.6	4	2	156	5606	34x7	34x7D
Int. Harvester HS-74	3½	4850	Hall-S 152	4	4¾x5½	36.1	Pb	Zen	Vac	RB	Own	U	5	Eat 74	2R	70.5	4	4	160	10700	36x5S	40x12S
Int. Harvester HS-74-C	3½	4850	Hall-S 152	4	4¾x5½	36.1	Pb	Zen	Vac	RB	Own	U	5	Own A M 427	Ch	79.1	4	4	160	11000	36x6S	40x12S
Int. Harv's'r HS-104-C	5	5500	Hall-S 152	4	4¾x5½	36.1	Pb	Zen	Vac	RB	Own	U	5	Own A M 427	Ch	90.5	4	4	160	11095	36x6S	40x14S
La France-Repub. A-1	*6000	990	Lyc	6	2⅞x4¾	19.8	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	36.1	4	Tr	132	3000	5.50x20	32x6
La France-Repub. C-1	*7000	1295	Lyc	6	3¼x4½	25.4	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	29.1	4	Tr	144	3300	6.00x20	32x6
La France-Repub. D-1	*9000	1595	Lyc	6	3¼x4½	25.4	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	37.9	4	Tr	144	3725	30x5	30x5D
La France-Repub. F-2	*13000	2395	Lyc	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Ful	U	4	Tim	Sp	40.1	4	D	174	5870	32x6	32x6D
La France-Repub. H-1	*15000	2985	Lyc	6	3⅞x5	36.0	Pb	Zen	Vac	Aut	Ful	U	4	Eat	Sp	36.0	4	D	163	5850	34x7	34x7D
La France-Repub. L-1	*18000	3595	Lyc	6	3⅞x5	36.0	Pb	Zen	Vac	Aut	Ful	U	4	Eat	2R	48.0	4	D	180	6900	36x8	36x8D
La France-Repub. M-1	*20000	3800	Wak	6	4 x4¾	38.4	Pb	Zen	Vac	Aut	Ful	U	5	Eat	2R	62.3	R	D	171	6900	36x8	36x8D
Mack BL	1	2500	Own	6	3¼x5	25.39	Pw	Str	Vac	NE	Own	U	4	Own	Sp	Opt	4	D	148	—	B6.00x20	DB6.00x20
†Mack BG	1½	3000	Own	6	3⅝x5	31.57	Pw	Str	Vac	NE	Own	U	4	Own	Sp	Opt	4	D	138-156	—	32x6	D32x6
Mack AB	2½-3	3950	Own	4	4¼x5	28.9	Pb	Str	Gra	RB	Own	U	4	Own	2R	Opt	R	D	2-Opt	—	36x4S	36x8S
††Mack AB	2½-3	3500	Own	4	4¼x5	28.9	Pb	Str	Gra	RB	Own	U	4	Own	Ch	Opt	R	D	2-Opt	—	36x4S	36x8S
Mack AB	2½-3	4750	Own	6	3⅝x5	31.57	Pw	Str	Vac	NE	Own	U	4	Own	2R	Opt	R	D	2-Opt	—	34x7	D34x7
††Mack AB	2½-3	4300	Own	6	3⅝x5	31.57	Pw	Str	Vac	NE	Own	U	4	Own	Ch	Opt	R	D	2-Opt	—	34x7	D34x7
††Mack BC	3½-4	4250	Own	4	4¼x5	28.9	Pb	Str	Gra	RB	Own	U	4	Own	2R	Opt	4	D	2-Opt	—	36x5S	36x5DS
††Mack BC	3½-4	5250	Own	6	4 x5½	38.4	Pb	Str	Vac	NE	Own	U	4	Own	2R	Opt	4	D	2-Opt	—	34x7	D36x8
††Mack BJ	3½-5	6150	Own	6	4½x5½	48.6	Pb	Str	Vac	NE	Own	C	4	Own	2R	Opt	4	D	3-Opt	—	36x8	36x8D
††Mack AK	3½-5	5150	Own	4	5 x6	40.0	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	4	J	3-Opt	—	36x5S	36x5DS
††Mack AK	3½-5	5250	Own	4	5 x6	40.0	Pb	Str	Gra	RB	Own	C	4	Own	2R	Opt	4	D	3-Opt	—	36x5S	36x5DS
††Mack AC	3½-5	4950	Own	4	5 x6	40.0	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	J	R	3-Opt	—	36x5S	40x10S
††Mack AC	5½-7	5500	Own	4	5 x6	40.0	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	J	R	3-Opt	—	36x6S	40x12S
††Mack AC	7½	6000	Own	4	5 x6	40.0	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	J	R	3-Opt	—	36x7S	40x14S
††Mack AP	7½	9500	Own	6	5 x6	60.0	Pb	Str	Gra	NE	Own	J	4	Own	Ch	Opt	R	J	191	—	36x7S	40x8DS
Mack A C 6-wheel	10	7500	Own	4	5 x6	40.0	Pb	Str	Gra	RB	Own	J	4	Own	Ch	Opt	4R	J	3-Opt	—	36x7S	40x12S
Mack AP 6-wheel	10	12000	Own	6	5 x6	60.0	Pb	Str	Gra	NE	Own	J	4	Own	Ch	Opt	4R	J	3-Opt	—	36x7	40x12S
Paige	¾	860	Own	6	3¼x4½	25.35	Pb	DL	P	DR	W-G	U	3	Sal	Sp	17.36	4	Tr	115	2465	B5.50x19	B5.50x19
Relay Series 15	¾	1370	Con 17 E	6	3⅜x4	27.3	Pb	Str	Vac	Aut	W-G	U	4	Own	R	38.4	4	D	131	3750	30x5P	30x5P

Major Specifications and Mechanical Details of 1930 Commercial Cars Built in the United States

Make and Model	Capacity—Tons	Chassis Price	Engine	No. of Cyl.	Bore and Stroke	Tax H. P.	Oily System	Carburetor	Fuel Feed	Ignit. System	Gear Set	Location	No. Spds. For.	Rear Axle	Final Drive	Reduction in Low	Brakes, Foot	Brakes, Hand	Standard Wheel Base	Chassis Weight	Standard Tire Sizes Front	Rear
Relay Series 15	1	1400	Con 17 E	6	3⅜x4	27.3	Pb	Str	Vac	Aut	W-G	U	4	Own	R	38.4	4	D	139	3800	30x5P	30x5P
Relay Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L	U	4	Own	R	34.5	4	D	168	5300	34x5	D34x5
Relay Series S 11	2	2030	Bud H S 6	6	3⅜x4½	27.3	Pb	Zen	Vac	Aut	Br-L	U	4	Own	R	30.0	4	D	162	4700	32x6	D32x6
Relay Series 50	2	3860	Bud D W 6	6	3⅞x5	33.7	Pb	Zen	Vac	Aut	Br-L	U	5	Own	R	58.5	4	D	161	6800	36x6	D36x6
Relay Series 60	2½	4555	Bud B A 6	6	4 x5⅛	40.8	Pb	Zen	Vac	Aut	Ful	U	5	Own	R	63.7	4	D	175	7350	36x6	D36x6
Relay Series 80	3	5330	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	U	8	Own	R	84.18	4	D	175	8400	36x6	S40x10
Relay Series 80	4	5380	Bud B A	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Cov	C	8	Own	R	84.18	4	D	175	8800	38x7	S40x14
Relay Series 100	5	6615	Con 21 R	6	4⅜x4¾	45.9	Pb	Str	Vac	Aut	Ful	U	5	Own	R	63.7	4	D	230	10000	9.00x24	D9.75x24
Reo D F 129	½	1095	Own	6	3⅜x5	27.3	Pb	Sch	P	DR	Own	U	3	Own	Sp	17.1	4	Tr	129	——	6.00x20	32x6
Reo 15 Junior	½	785	Con 16 E	6	3⅜x4	27.3	Pb	Sch	P	DR	W-G	U	3	Sal	Sp	14.63	4	Tr	115	2290	6.00x18	6.00x18
Reo D F	1	1095	Own C B	6	3⅜x5	27.3	Pb	Sch	P	DR	Own	U	3	Own	Sp	17.1	4	Tr	135	3200	6.00x20	32x6
Reo F A	1½	1295	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	22.96	4	Tr	135	3525	6.50x20	32x6
Reo F E	1½	1395	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	22.96	4	Tr	152	3700	6.50x20	32x6
Reo F F	1½	1395	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	22.96	4	Tr	156	3750	6.50x20	32x6
Reo F H	2	1595	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	37.6	4	Tr	142	4165	32x6	32x6D
Reo F C	2	1645	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	37.62	4	Tr	152	4025	32x6	32x6D
Reo F D	2	1745	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	37.62	4	Tr	168	4075	32x6	32x6D
Reo G A	3	3035	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	41.05	4	Tr	163	4625	32x6	32x6D
Reo G C	3	2140	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	41.05	4	Tr	179	4850	32x6	32x6D
Reo G D	3	1985	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	46.2	4	Tr	144	4570	32x6	32x6D
Reo G C S	3	2375	Own	6	3⅜x5	27.3	Pb	Sch	Vac	DR	Own	U	4	Own	Sp	41.05	4	Tr	210	5320	32x6	32x6D
Rugby T	½	655	Con	6	3¼x4	25.4	Pb	Str	P	Aut	Own	U	3	Own	Sp	15.6	4	4	——	2160	29x5	29x5
Rugby 6-15	1	865	Con	6	3¼x4	25.4	Pb	Str	P	Aut	Br-L	U	4	Sal	Sp	34.49	4	Tr	135	2900	20x5.50	32x6
Rugby 615	1½	930	Con	6	3¼x4	25.4	Pb	Str	P	Aut	Br-L	U	4	Sal	Sp	34.49	4	Tr	135	3000	5.50x20	30x5D
Selden 7 C	1	1098	Con	6	2⅞x4¾	19.84	Pb	Zen	Vac	Aut	Br-L	U	3	Tim	Sp	—	4	D	124	3600	30x5	30x5
Selden 17 C	1½	1500	Con	6	3⅜x4	27.3	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	142	3000	32x6	32x6
Selden 317 C	1½	1610	Con	6	3⅜x4⅝	27.34	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	142	3900	32x6	32x6
Selden 37 C	2	1935	Con	6	3⅜x4⅝	27.34	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	151	4800	32x6	32x6D
Selden 39 C	2½	2020	Con	6	4 x4¼	38.4	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	164	5800	32x6	32x6D
Selden 47 C B	3½	3785	Con	6	4 x4½	38.4	Pb	Str	Vac	Aut	Br-L	U	4	Tim	Sp	—	4	D	171	7200	34x7	34x7D
Selden 47 C D	4	4435	Con	6	4 x4½	38.4	Pb	Str	Vac	Aut	Br-L	U	5	Wis	2R	—	4	D	171	7600	36x8	36x8D
Selden 67 C	5	4975	Con	6	4⅜x4¾	45.94	Pb	Str	Vac	Aut	Br-L	C	7	Wis	2R	—	4	D	171	8700	36x8	36x8D
Selden 77	7	7365	Con	6	4¾x5¾	54.15	Pb	Str	Vac	Aut	Br-L	C	7	Wis	2R	—	4	D	178	12000	36x7	40x7D
Service Series S 11	1	1600	Bud H S 6	6	3⅜x4½	27.3	Pb	Zen	Vac	Aut	Br-L	U	4	Col	Sp	25.5	4	D	142	3900	30x5	30x5
Service Series 40	1½	2990	Bud D S 6	6	3⅝x5	31.5	Pb	Zen	Vac	Aut	Br-L	U	4	Tim	Wo	34.8	4	D	168	4700	34x5	D34x5
Service Series 60	2½	4580	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Ful	U	5	Tim	Wo	63.0	4	D	175	7000	36x6	36x6
Service Series 80	3½	5250	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	98.2	4	D	175	8200	S36x6	S36x12
Service Series 80	4	5330	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	98.2	4	D	175	8400	S36x6	S36x14
Service Series 100	5	5830	Bud B A 6	6	4⅛x5⅛	40.8	Pb	Zen	Vac	Aut	Br-L	C	7	Tim	Wo	95.0	4	D	175	9600	S36x6	S40x14
Stewart 30	1	695	Lyc AFE	4	3¾x4½	22.5	Pb	Str	Vac	DR	W-G	U	4	Sal	Sp	35.1	4	D	130	2905	6.50x20	6.50x20
Stewart 30 X	1	795	Lyc WRG	6	2⅞x4¾	19.8	Pb	Str	Vac	DR	W-G	U	4	Sal	Sp	35.1	4	D	130	2965	6.50x20	6.50x20
Stewart 40	1½	895	Lyc AFE	4	3¾x4½	22.5	P	Str	Vac	DR	W-G	U	4	Cla	Sp	35.1	4	D	130	3215	6.50x20	6.50x20D
Stewart 34 X	1½	1195	Lyc 4 SL	6	3⅛x4½	25.3	Pb	Str	Vac	DR	W-G	U	4	Cla	Sp	35.1	4	D	145	3526	6.50x20	6.50x20
Stewart 28 X	1¾	1495	Lyc 4 SL	6	3⅛x4½	25.3	Pb	Str	Vac	DR	Ful	U	4	Cla	Sp	44.1	4	D	136	3840	6.50x20	6.50x20
Stewart 29XS	2	1695	Lyc ASA	6	3⅝x4½	25.3	Pb	Str	P	DR	Ful	U	4	Cla	Sp	44.1	4	D	145	4188	32x6	32x6D
Stewart 26 XW	2	2290	Lyc TF	6	3⅝x5	31.5	Pw	Str	Vac	DR	Ful	U	4	Tim	Wo	48.1	4	D	165	5095	32x6	32x6D
*Stewart 18 X	2½	2690	Lyc TF	6	3⅝x5	31.5	Pw	Str	Vac	DR	Ful	U	4	Tim	Wo	48.1	4	D	165	5788	32x6	32x6D
Stewart 32 X	2½	1990	Lyc ASA	6	3⅝x4½	31.54	Pw	Str	Vac	DR	Ful	U	4	Cla	Sp	46.1	4	D	165	5100	32x6	32x6D
Stewart 33 X	3	3290	Lyc TS	6	3⅞x5	36.2	Pw	Str	Vac	DR	Ful	U	4	Tim	Wo	105.1	4	D	165	6450	34x7	34x7D
Stewart 19 X	3½	3690	Lyc TS	6	3⅞x5	36.2	Pw	Str	Vac	DR	Ful	C	12	Tim	Wo	105.1	4	D	165	6990	36x5	36x10
Stewart 31 X	5	4990	Wak 6 RSL	6	4⅜x5⅛	45.9	Pw	Str	Vac	DR	Ful	C	8	Tim	Wo	82.1	4	D	165	8400	36x6S	36x8SD
Stewart 27 X	6-7	5700	Wak 6 RSL	6	4⅜x5⅛	45.99	Pw	Str	Vac	DR	Ful	U	8	Tim	Wo	93.81	4	D	165	9927	36x7	40x7D
Studebaker GN-P	¾	345	Own	6	3⅜x4⅛	27.3	Pb	Str	P	DR	Own	U	3	Own	Sp	15.15	4	‡4	115	2465	6.00x19	6.00x19
Studebaker GN-S	1	1045	Own	6	3⅜x4⅛	27.3	Pb	Str	P	DR	Own	U	3	Own	Sp	13.8	4	D	130	2990	6.00x20	30x5
Studebaker GK-N	1	1095	Own	6	3⅜x4⅛	27.3	Pb	Str	P	DR	Own	U	3	Own	Sp	13.8	4	D	146	3000	30x5	30x5
Studebaker S-20	1½	695	Own	6	3¼x4⅛	25.4	Pb	Str	P	DR	W-G	U	4	Tim	Sp	36.2	4	4	130	3000	6x20	32x6
Studebaker S-30	1½	775	Own	6	3¼x4⅛	25.4	Pb	Str	P	DR	W-G	U	4	Tim	Sp	36.2	4	4	160		6x20	32x6
Studebaker S-50	2	895	Own	6	3¼x4⅛	25.4	Pb	Str	P	DR	W-G	U	4	Tim	Sp	37.4	4	4	148		6.50x20	6.50x20D
Studebaker S-60	2	945	Own	6	3¼x4⅛	25.4	Pb	Str	P	DR	W-G	U	4	Tim	Sp	37.4	4	4	160		6.50x20	6.50x20D
Studebaker GN-N	*4000	1245	Own	6	3⅜x4¼	27.3	Pb	Str	P	DR	Cla	U	4	Cla	Sp	33.5	4	D	146	3265	30x5	32x6
Studebaker 77	*12500	2895	Own	8	3½x4¾	39.2	Pb	Str	P	DR	Ful	U	4	Eat	Sp	24.6	4V	D	158	5030	7.00x20	7.00x20D
Studebaker 88	*12500	3295	Own	8	3½x4¾	39.2	Pb	Str	P	DR	Ful	U	4	Eat	Sp	24.6	4V	D	184	5200	7.50x20	7.50x20D
Studebaker 99	*14000	3795	Own	8	3½x4¾	39.2	Pb	Str	P	DR	Ful	U	4	Eat	Sp	24.6	4V	D	184	5680	7.50x20	7.50x20D
Whippet 96 A	½	360	Own 96 A	4	3⅛x4⅜	15.6	Pb	Til	Vac	Aut	Own	U	3	Own	Sp	14.74	4	R	103¼	1691	4.75x19	4.75x19
White 15 B		1545	Own GKA	4	3¾x5⅛	22.5	CS	Zen	Vac	L-N	Own	C	4	Own	Sp	18.6	R	R	133½	3402	30x5	30x5
White 60		1850	Own 2 A	6	3½x4½	29.4	Pw	Zen	Vac	DR	Own	U	3	Own	Sp	17.9	4	D	138	3739	30x5	30x5
White 57		2725	Own GRC	4	4 x5¾	25.6	Pw	Zen	Vac	L-N	Own	U	4	Own	Sp	19.3	R	R	146	3935	32x6	32x6
White 20 A		2125	Own GKA	4	3¾x5⅛	22.5	CS	Zen	Vac	L-N	Own	C	4	Own	2R	32.1	R	R	145½	4572	34x5	34x5D
White 61		2450	Own 4 A	6	3⅛x4½	33.75	Pw	Zen	Vac	DR	Own	U	4	Own	Sp	23.4	4	D	148	4789	30x5	30x5D
White 56		3125	Own GRC	4	4 x5¾	25.6	Pw	Zen	Vac	Mag	Own	U	4	Own	Sp	26.2	R	D	165	5276	36x4S	36x7S
White 51 A		3750	Own GRB	4	4¼x5¾	28.9	Pw	Zen	Vac	Mag	Own	U	4	Own	Sp	35.6	R	D	170	6438	36x5S	36x9S
White 58		4400	Own GRB	4	4¼x5¾	28.9	Pw	Zen	Vac	Mag	Own	U	4	Own	IG	49.7	D	R	170	6438	36x5S	36x9S
White 55		4650	Own GRB	4	4¼x5¾	28.9	Pw	Zen	Vac	Mag	Own	U	4	Own	IG	66.1	D	R	174	8737	36x5S	40x5SD
White 52 T		4700	Own GR3	4	4¼x5¾	28.9	Pw	Zen	Vac	Mag	Own	U	4	Own	IG	76.5	D	R	129½	8461	36x5S	40x5SD
White 52		5100	Own GRB	4	4¼x5¾	28.9	Pw	Zen	Vac	Mag	Own	U	5	Own	IG	92.3	D	R	174	9409	36x6S	40x12S
White 59 A		6000	Own 3 A	6	4 x5¼	38.4	Pw	Zen	P	DR	Own	U	4	Own	Sp	66.5	D	R	155	9775	40x8	40x14S
White 63		5000	Own 3 A	6	4 x5¼	38.4	Pw	Zen	P	DR	Own	U	4	Own	Sp	41.4	4	D	168	8350	34x7P	34x7DP
White 64		6300	Own 1 A	6	4⅜x5¾	45.94	Pw	Zen	P	LN	Own	U	4	Own	2R	46.8	4	D	180	9154	36x8P	36x8DP
Willys Six 98 B	½	525	Own 98 B	6	3¼x37/8	25.35	Pb	Til	Vac	Aut	Own	U	3	Own	Sp	14.28	4	B	110	1903	5.50x19	5.00x19
Willys Six C-101	1½	695	Own 98 B	6	3¼x37/8	25.35	Pb	Til	Vac	Aut	Own	U	4	Cla	Sp	36.12	4	B	131	2675	5.50x20	30x5
Willys-Knight T-103	1½	825	Own KGT	6	2 1/2x4¾	20.7	Pb	Til	Vac	Aut	Cov	U	4	Cla	Sp	42.33	4	B	131	2808	5.50x20	30x5

GENERAL NOTATIONS

*†REFERENCE MARKS apply to individual lines only and explanations are given under the subdivision for each company in the "SPECIAL NOTATIONS."

CAPACITIES given in this table are in tons or fractions of tons. *Shows maximum allowable gross weight in pounds.

WHEEL BASES given are standard, but optional wheel bases are available in many cases.

ENGINE—Bud, Buda; Con, Continental; Her, Hercules; Kgt, Knight; Lyc, Lycoming; Wak, Waukesha; Wis, Wisconsin; Hall, American Car & Foundry.

LUBRICATION—Pb, pressure lubrication to main and connecting rod bearings; Pw, full pressure lubrication to all main, connecting rod and camshaft bearings, including wrist pins; SC, circulating splash; Sp, splash.

CARBURETOR—Car, Carter; Mar, Marvel; Sch, Wheeler-Schebler; Str, Stromberg; Det, Detroit Lubricator; Til, Tillotson; Zen, Zenith-Detroit.

FUEL FEED—Gra, Gravity; Vac, Vacuum tank; P, Fuel pump.

IGNITION — AB, American-Bosch; Aut, Electric Auto-Lite; Eis, Eisemann; L-N, Lowe-Neville; N-E, North East; RB, Robert Bosch; DR, Delco-Remy; Mag, Magneto.

TRANSMISSION—Br, L, Brown-Lipe; Cov, Covert; Ful, Fuller; Mec, Mechanics Universal; Mun, Muncie; W-G, Warner Gear; Cotta, Cotta Gear Company.

LOCATION—C, center, amid; U, in unit with engine; J, on jackshaft.

REAR AXLE—Cla, Clark Equipment; Col, Columbia; Eat, Eaton; Sal, Salisbury; Tim, Timken; Wis, Wisconsin.

FINAL DRIVE—IG, Internal gear; St Straight bevel; Sp, Spiral bevel; Wo, Worm; 2R, Double reduction; Ch, Chain; R, Relay drive.

BRAKES—J, Jackshaft; R, Rear wheels; D, Drive shaft; 4, four-wheel; Tr, Transmission; V, Vacuum booster; W, Westinghouse air brake; B, Both front and rear wheels.

TIRES—B, Balloon; D, Dual; S, Solid; P, Pneumatic

SPECIAL NOTATIONS

AMERICAN-LA FRANCE

*Chief model also available as 2½-ton model, 34x7 tire, dual rear, weight 6,400. Price $3,900.

Chieftain model also available as Dump Truck, 160-inch wheel base.

Balloon tires optional on Chief, Chieftain and Big Chief models.

AUSTIN

*Price includes body.

AUTOCAR

*Engines in these models are located under the driver's seat.

DAY-ELDER

Models CF and HF also available in 136-inch wheel base.

Model JF also available in the following wheel bases; 165, 180 and 204.

Model KF also available in 202-inch wheel base and tractor 149.

DURANT LINE

*Price includes panel body.

DODGE

Dodge Model F 36 A to D is available on 165-inch wheel base. Model F 41 A to E is available on 155-inch wheel base. Model F 61 A to E is available on 170-inch wheel base. Model F 62 A to E is available on 195-inch wheel base.

F. W. D.

*Indicates six-wheel model. Special power take-off transmission, which provides 3 power take-offs which may be operated in any transmission speed, optional on all models.

*Foot brake on X6 is a Lockheed type, operating on all six wheels.

FEDERAL

*Six wheelers.

GRAMM

*Models L, C, D and E are furnished in three wheel base lengths—others on request.

*Models GY and GYB also available in 190-inch wheel base.

*Models HY and HYB also available in 210-inch wheel base.

Tire sizes and electrical equipment optional, depending upon type of service—coach or van.

*Model O series, large engine, pneumatic tires, special wheel bases optional at extra cost.

*Model T series, large engine, pneumatic tires, special wheel bases and 8 speed transmission optional at extra cost.

GENERAL MOTORS TRUCK LINE

*Capacity indicated for each chassis is the recommended gross weight without exceeding rated capacity of tires. The tire size does not affect the straight rating for which chassis is guaranteed and each model is designed to operate satisfactorily under average conditions with loads giving a total gross weight (chassis, body, equipment and payload) equal to straight rating given below. The additional standard wheel base lengths, the number of additional tire types (tire combinations—each type carrying a recommended gross weight) and the ton range on a nominal payload basis for each model is given below.

Model	Straight Rating	Additional Wh. bases, ins.			Tires Add'l Pay'l	Range
T-11	3800	None			None	½
T-15	5400	141			2	¾
T-17	6500	141			6	¾-1¼
T-19	8500	141	152	16	1-2	
T-25	8500	141	152	11	1-1¾	
T-30	11000	152	164	12	1½-2½	
T-42	14000	152	164	181	10	2-3½
T-44	15000	152	164	181	10	2-4
T-60	18500	166¾	184½	200¼	16	2½-4½
T-82	22000	167½	185¼	201	10	3-6
T-90	28000	201		220	5	5-7½

Optional rear axle ratios are available for all models.

MACK LINE

Other wheel bases furnished on all truck models.

On 6-wheel jobs, 4 rear wheels driven by chains, foot brake on 4 rear wheels.

HYP—Hypoid drive, single reduction.

‡‡Made also in tractor models.

REO LINE

Model F A also available in 129-inch wheel base.

RUGBY

F—Chassis weight includes body.

STEWART LINE

Model 30 and 30X can also be supplied in 129 and 149-inch wheel base.

Model 40 can also be supplied in 149 and 160-inch wheel base.

*Model 34X can be supplied in 145, 160 and 176-inch wheel base.

Model 28X can be supplied in 145, 160 and 176-inch wheel base.

Model 29XS can be supplied in 160 and 176-inch wheel base.

*Model 26XW can be supplied in 148, 176 and 190-inch wheel base.

*Models 18X, 32X and 33X can be supplied in 148, 190 and 220-inch wheel base. Models 19X, 31X and 27X can be supplied in 148, 172, 190, 220 and 235-inch wheel base.

As optional equipment models 18X, 19X, 33X, 31X and 27X can be supplied with Timken dual reduction rear axle.

STUDEBAKER LINE

*Capacity model GN-N is 4,000 pounds for body, cab, driver and payload.

Maximum gross load, chassis, body and payload for Models 77 and 88 is 12,500 lbs. and for Model 99 is 14,000 lbs.

‡Hand brake same as foot brake, standard. Hand brake on drive shaft, special equipment.

Production--Engineering--Factory

Volatility Requirements Of Aircraft Fuels

(Continued from Page 7)

quantity of light components evaporate, and so make the initial start possible, but a relatively high temperature would be required before the component could be evaporated, and with such a mixture it is necessary to supply a very rich mixture from the carburetor during this period, in order to supply enough of the very light material to the cylinders. It is desirable, therefore, to provide a fuel which has a small quantity of very light material and a larger quantity of medium light material, which will not require a high temperature for evaporation so that after the initial start the engine needs only to be warmed up for a short while in order to get maximum performance without supplying an excessively rich mixture from the carburetor.

It is not possible to reduce this factor to a definite percentage required for evaporation as is the case with the initial start, since the conditions under which the fuel evaporated are constantly changing from the time of the initial start until the time when the engine is fully warmed up and ready to deliver its maximum power output.

In addition to this a great deal depends upon the ability of the carburetor to supply an even mixture ratio over a wide range of speed and the ability of the induction system to deliver this mixture ratio evenly to each cylinder. Clearly much also depends upon the time in which the engine attains its normal working temperature. As a broad generalization, however, it may be said that the smoothness of operation, the time to warm-up, and the amount of crankcase dilution during the warming-up period, depends upon the temperature necessary to evaporate about 60 per cent. or 70 per cent. of the fuel. Here again the temperature at which this percentage should be evaporated must be based largely on careful reasoning and might also with advantage vary slightly with the atmospheric temperature.

We now have to consider the question of the importance of the volatility of the fuel when the engine is fully warmed up and delivering its maximum power output. In order to obtain the best possible fuel consumption consistent with maximum power output, it is necessary that each cylinder receive a uniform ratio of fuel and air at every suction stroke independent of the speed of the engine and atmospheric pressure. This means that not only must the carburetor deliver an even mixture ratio from the jet at all air speeds and pressures, but the induction system must distribute this mixture evenly to every cylinder.

In aeroplane engines this is particularly difficult due to the unusual nature of the induction system. Again in order to obtain the maximum possible volumetric efficiency and so obtain maximum power output, we must keep the external heat input down to the least possible amount, supplying just sufficient to overcome troubles due to ice formation on the carburetor and throttle. Clearly in order to obtain good distribution under normal working temperatures the greater portion of the fuel must evaporate in the manifold; that is the percentage evaporated required is practically 100 per cent. and, therefore, the point of the continuous distillation curve which would give us the best measure of the volatility of the fuel in this respect is the 100 per cent. evaporated point or the "dew point."

The dew point temperature should be kept sufficiently low to insure that the greater percentage of the fuel will evaporate under the relatively cool conditions that should exist in the average aeroplane engine induction manifold.

To sum up, so far, it is seen that at the start we will require a small percentage, say some 20 per cent. to be evaporated under varying temperature conditions. The selection of the temperature at which this percentage should be evaporated is dependent primarily on the atmospheric temperature and might with advantage be made flexible, depending on this temperature.

In order to insure that a short time elapses before the engine starts running normally without undue use of the primer, some 60 or 70 per cent. of the gasoline should evaporate at relatively low temperatures. These depend more on the design of the engine, manifold, heater, etc., than on atmospheric temperatures and it is not necessary to have specifications to take care of variations in atmospheric temperatures in this respect.

In dealing with the problem of the performance under normal working conditions the dew point or 100 per cent. evaporation point, is probably the most important factor as regards the volatility of the fuel, which will insure good distribution, but here again it is impossible to detect small differences in dew point, and the design of the induction system and carburetor, and to a large extent the valve timing being the most important factors which control the distribution efficiency of any given engine. However, in order to insure the best possible distribution efficiency together with the maximum possible volumetric efficiency, the dew point of an aviation fuel must be considerably lower than that of an ordinary motor fuel, in order to function satisfactorily in the relatively cool induction system of an aircraft engine.

In discussing the question of initial start it was mentioned that if the fuel were too volatile and the engine over-primed it might not be possible to start the engine. There are yet two further troubles which may be encountered if the initial volatility of the fuel is too great: Vapor locking trouble and fire hazard.

The former has been recognized comparatively recently and a considerable amount of work has been carried out by Dr. Bridgeman of the Bureau of Standards investigating the cause of this trouble. If the temperature of the liquid gasoline is such that the vapor pressure of the fuel exceeds the external pressure, then a bubble of vapor will be formed somewhere in the fuel feed system or the jet of the carburetor depending upon where that temperature is reached. This bubble of vapor may or may not cause trouble, depending on whether or not it hinders the flow of liquid gasoline through the jet. In some fuel feed systems, considerable vapor can be formed in the float chamber of the carburetor or in the tank without affecting operation, due to the fact that the vapor is freely vented and does not stop the flow of liquid gasoline to the jet. Again the flow may be restricted slightly provided the carburetor is set sufficiently rich that the mixture strength is not unduly weakened.

However, as far as the fuel is concerned, it seems from various experiments that the actual vapor locking tendency appears in the average case to be related to the vapor pressure when measured in an apparatus which allows two or three per cent. of the gasoline to evaporate, or, in other words, the vapor locking tendency is probably best related to about the two or three per cent. point of the equilibrium distillation curve, considering the design of the average fuel feed system and history of the gasoline.

Since the danger of vapor lock as well as the ease of starting depends in large measure upon the atmospheric temperature, it is advantageous to base specifications concerning the lighter fractions of the fuel upon the atmospheric temperature and in the case of vapor lock the ceiling which it is desired to reach. The possibility of vapor lock depends to some extent also upon the location of the fuel tank, whether in the wings or fuselage, and whether a gravity feed or fuel pump is used in supplying the carburetor; since these factors control the temperature and pressure to which the liquid fuel is subjected before it reaches the carburetor jet.

Vapor locking is much more serious in military than in commercial aviation, because in the former the gasoline tanks are almost always so located that there is a negative pressure head on the intake side of the gasoline pump, especially when the gasoline is low in the tank, and also due to the greater altitudes at which military planes are obliged to operate.

The other danger which must be considered in connection with the lighter fractions of the gasoline is the possibility of fire in case of a crash if the fuel happens to come in contact with the hot exhaust pipe. While our control over this factor is somewhat limited, yet we can reduce the danger by maintaining as low vapor pressure as possible in order to reduce the possibility of forming an explosive mixture.

To sum up this second phase, therefore, in order to avoid vapor locking troubles with any given fuel system and to reduce the fire hazard to a minimum it is necessary to keep the vapor pressure or the first two or three per cent. of the equilibrium distillation curve as high as possible consistent with the specification for insuring adequate starting and that these specifications can with advantage be made flexible depending on the atmospheric temperature.

From all of the foregoing it appears that the ideal fuel is one that has a sufficiently high initial boiling point to avoid vapor lock and minimize fire hazard, but inasmuch as the starting characteristics of an airplane engine fuel, especially in cold weather, are dependent more upon the temperature at which, say 20 per cent. comes off than upon the initial boiling point of the fuel. It appears that the more we remove of the "hump" in the continuous distillation curve without lowering the initial boiling point the better starting characteristics the fuel will have and the better warming up characteristics.

Fuel Requirement for Use in Aircraft Engines

(Continued from Page 7)

cess of 20 per cent. on account of ice formation in the induction systems and freezing in the fuel systems, and even 20 per cent. is troublesome. A freezing point of —75° Fahr. for the finished fuel blend appears to be about the upper limit for satisfactory operation, and a lower limit of roughly—150° Fahr. is to be desired. Aromatics of low freezing point, synthesized from benzol, appear to be the only antiknocks of possible general availability, other than dopes, for the raising of the antiknock value of the above, discussed bases to antiknock ratings of the order of 87 octane, 13 heptane.

Of the dopes, tetraethyl lead is at present the only one of interest for large scale use. Many present types of aircraft engine develop troubles when operated on fuels containing tetraethyl lead. Several, however, are virtually free of operating troubles from this cause. Engines requiring fuels with anti-knock ratings of the order of 87 octane are all of the super-performance type for military use, and the troubles arising with lead are vastly less difficult to overcome than those caused by insufficient anti-knock value. For the present, the Air Corps is requiring that super-performance engines developed for its use shall operate satisfactorily on fuel containing 6 cc. of lead per gallon.

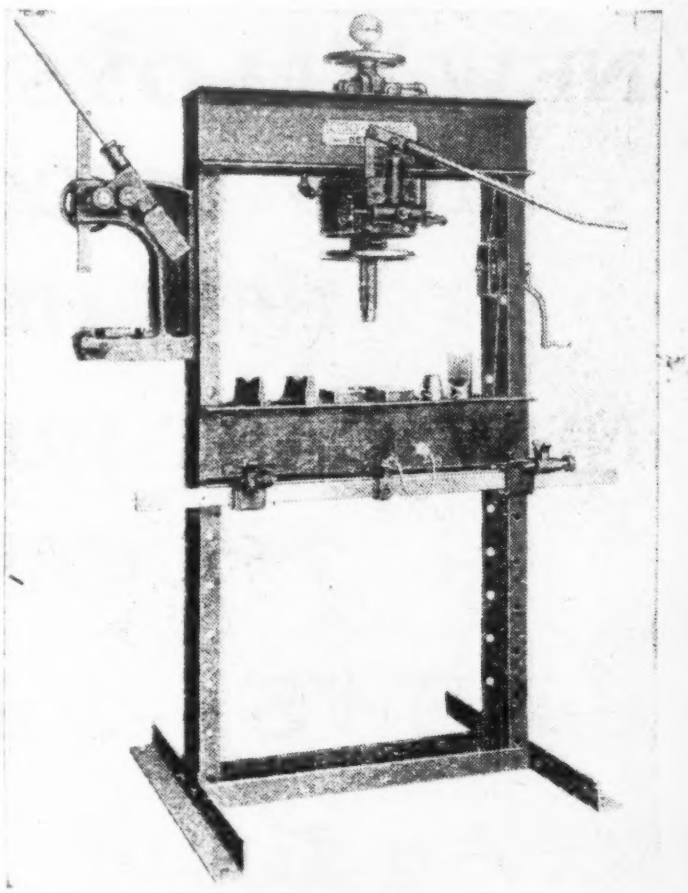
The Air Corps feels that operating troubles with lead have been overcome in automobile engines and can equally be overcome in aircraft engines. From the experience of the Air Corps, troubles with lead in aircraft fuel can apparently all be overcome by design, material and lubrication changes.

Under the high-temperature conditions of knock test specified in Specification Y-3557, very large supplies of straight-run California gasoline that will meet the anti-knock value required with less than the allowable maximum lead concentration of 6 cc. per gal. appear to be available.

Knock tests to Specification Y-3557 (300° Fahr. jacket temperature) of cracked gasolines without lead addition against the best of the straight-run California gasolines without added lead show that the cracked base is in cases superior in anti-knock value. This superiority usually disappears when lead is added to both, as the cracked base with 10 cc. of lead added is at times inferior to the California base with 3 cc. of lead. The lead response of some cracked fuels appears to be slight and in other cases to be virtually nil after a particular concentration has been reached.

Corrosion troubles arise with the use of Ethyl gasoline in some aircraft engines, but corrosion due to fuel is by no means always the result of the use of lead. A recent case of violent engine corrosion at the Material Division was traced to high-sulphur benzol. The Air Corps, as a result of this case, does not feel that the present sulphur limit of 0.1 per cent. for the finished fuel can be raised nor the copper-dish corrosion test be abolished.

Kent-Moore Brings Out New Hydraulic Press



New Kent-Moore forty-ton press

The Kent-Moore Organization, Detroit, Mich., recently introduced a new forty-ton hydraulic arbor press known as the Model U-40.

The frame is of rolled channel steel construction completely welded.

Except for a small filter pipe, there is no outside piping. The oil reservoir and all working parts are contained in or on the hydraulic head.

A hand wheel screw feed is provided for adjusting the ram to the work. The ram is released by hydraulic means.

The table is adjustable by means of long pins, which can be inserted in the frame at six-inch intervals to support the table. The table is raised or lowered by a lifting device.

The specifications of this new press follow:—

Height overall	6 feet 8 inches
Floor space	36 inches by 43 inches
Travel of table	45 inches
Travel of piston	5 inches
Travel of screw	8 inches
Width between uprights or largest diameter of work	33 inches
Width between table channels or largest arbor	7 inches
Maximum distance from end of ram to top of table in lowest position	44½ inches
Maximum distance from end of ram to floor	56 inches
Leverage	400 to 1
Capacity	40 tons pressure
Weight	820 pounds

The price of the U-40 press including a table lifting device, 1-round ram nose, 1-"V" ram nose, 2-table plates and 2-"V" blocks is $115. The following additional equipment is available at extra cost—pressure gauge $10, testing and straightening attachment $15, dial indicator and bracket $11, two-ton rack and pinion side press $25.

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Clinton, Ia., Aug. 27.—New dealers appointed by the Climax Engineering Company of this city and Chicago, for the Northwestern United States and Western Canada, include the following:

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Construction Equipment Company, 1118-24 Hyde St., Spokane, Wash., C. A. Burnett, president.

British Columbia Equipment Company, 551 Howe St., Vancouver, B. C., F. A. Deitrich, president.

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